ACCOUNTANCY

COMPUTERISED ACCOUNTING SYSTEM

Textbook for Class XII

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राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
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Foreword

The *National Curriculum Framework* (NCF), 2005, recommends that children's life at school must be linked to their life outside the school. This principle marks a departure from the legacy of bookish learning which continues to shape our system and causes a gap between the school, home and community. The syllabi and textbooks developed on the basis of NCF signify an attempt to implement this basic idea. They also attempt to discourage rote learning and the maintenance of sharp boundaries between different subject areas. We hope these measures will take us significantly further in the direction of a child-centred system of education outlined in the *National Policy on Education* (1986).

The success of this effort depends on the steps that school principals and teachers will take to encourage children to reflect on their own learning and to pursue imaginative activities and questions. We must recognise that, given space, time and freedom, children generate new knowledge by engaging with the information passed on to them by adults. Treating the prescribed textbook as the sole basis of examination is one of the key reasons why other resources and sites of learning are ignored. Inculcating creativity and initiative is possible if we perceive and treat children as participants in learning, not as receivers of a fixed body of knowledge.

These aims imply considerable change in school routines and mode of functioning. Flexibility in the daily time-table is as necessary as rigour in implementing the annual calendar so that the required number of teaching days are actually devoted to teaching. The methods used for teaching and evaluation will also determine how effective this textbook proves for making children's life at school a happy experience, rather than a source of stress of boredom. Syllabus designers have tried to address the problem of curricular burden by restructuring and reorienting knowledge at different stages with greater consideration for child psychology and the time available for teaching. The textbook attempts to enhance this endeavour by giving higher priority and space to opportunities for contemplation and wondering, discussion in small groups, and activities requiring hands-on experience.

The National Council of Educational Research and Training (NCERT) appreciates the hard work done by the textbook development committee responsible for this book. We wish to thank the Chairperson of the advisory group in Social Sciences Professor Hari Vasudevan and the Chief Advisor for this book, Professor G.C. Maheshwari, Dean, Institute of Management Studies, M.S. University Baroda for guiding the work of this committee. Several teachers contributed to the development of this textbook; we are grateful to their principals for making this possible.

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We are indebted to the institutions and organisations which have generously permitted us to draw upon their resources, material and personnel. We are especially grateful to the members of the National Monitoring Committee, appointed by the Department of Secondary and Higher Education, Ministry of Human Resource Development under the Chairpersonship of Professor Mrinal Miri and Professor G.P. Deshpande, for their valuable time and contribution. As an organisation is committed to the systemic reform and continuous improvement in the quality of its products, NCERT welcomes comments and suggestions which will enable us to undertake further revision and refinement.

Director
National Council of Educational
Research and Training

New Delhi
December 2009

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Rationalisation of Content in the Textbooks

In view of the COVID-19 pandemic, it is imperative to reduce content load on students. The National Education Policy 2020, also emphasises reducing the content load and providing opportunities for experiential learning with creative mindset. In this background, the NCERT has undertaken the exercise to rationalise the textbooks across all classes. Learning Outcomes already developed by the NCERT across classes have been taken into consideration in this exercise.

Contents of the textbooks have been rationalised in view of the following:

- Overlapping with similar content included in other subject areas in the same class
- Similar content included in the lower or higher class in the same subject
- Difficulty level
- Content, which is easily accessible to students without much interventions from teachers and can be learned by children through self-learning or peer-learning
- Content, which is irrelevant in the present context

This present edition, is a reformatted version after carrying out the changes given above.

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- of opportunity in public employment;
- by abolition of untouchability and titles.

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- of certain protections in respect of conviction for offences;
- of protection of life and personal liberty;
- of free and compulsory education for children between the age of six and fourteen years;
- of protection against arrest and detention in certain cases.

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- for prohibition of employment of children in hazardous jobs.

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- freedom to manage religious affairs;
- freedom as to payment of taxes for promotion of any particular religion;
- freedom as to attendance at religious instruction or religious worship in educational institutions wholly maintained by the State.

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- for protection of interests of minorities to conserve their language, script and culture;
- for minorities to establish and administer educational institutions of their choice.

Right to Constitutional Remedies

- by issuance of directions or orders or writs by the Supreme Court and High Courts for enforcement of these Fundamental Rights.

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We are thankful to Microsoft Inc. and Tally Solutions for permitting us to use the templates of MS Excel and MS Access-2007 as a sample included in the text.

The Council acknowledges the efforts of *Computer Incharge,* Dinesh Kumar; *DTP Operators,* Anil Sharma and Basudev Tripathy; and *Copy Editor*, Mrs. Mamta Gaur.

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Overview of Computerised Accounting System

1

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Learning Objectives

After studying this chapter you will be able to:

- *Understand the need of Computerised Accounting System.*
- *Appreciate the impact of Information Technology on Financial Accounting System.*
- *Describe the major functions of Accounting Information System (AIS).*

Introduction

In modern business accounting transactions are processed through computers. Usage of computers and Information Technology (IT) enables a business to quickly, accurately and timely access the information that helps in decision-making. This sharpens the competitive edge and enhances profitability. The computer systems (Figure 1.1) works with the data which is processed by the hardware commanded by the user through software. The Computerised Accounting System (CAS) has the following components:

Procedure : A logical sequence of actions to perform a task.

Data : The raw fact (as input) for any business application.

People : Users.

Hardware : Computer, associated peripherals, and their network.

Software : System software and Application software.

These are the five pillars on which Computerised Accounting System rests. This chapter discusses the concept and components of CAS alongwith its advantages and disadvantages. It is followed by the discussion of software packages on CAS. In this chapter we will also discuss the concept about grouping of accounts and codification methods to be used for CAS.

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1.1 COMPUTERISED ACCOUNTING SYSTEM

Computerised Accounting System refers to the processing of accounting transaction through the use of hardware and software in order to produce accounting records and reports. CAS takes accounting

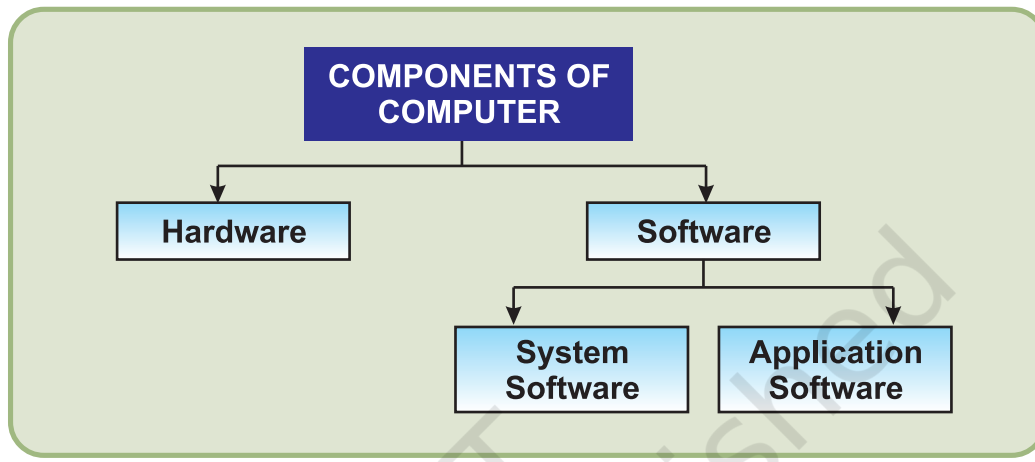

Figure 1.1 : Components of Computer

transactions as inputs that are processed through Accounting Software to generate the following reports:

- Day books/Journals
- Ledger
- Trial Balance
- Position Statement (Balance Sheet)
- Statement of Profit and Loss (Profit and Loss Account)

Basic flow of Accounting Transaction

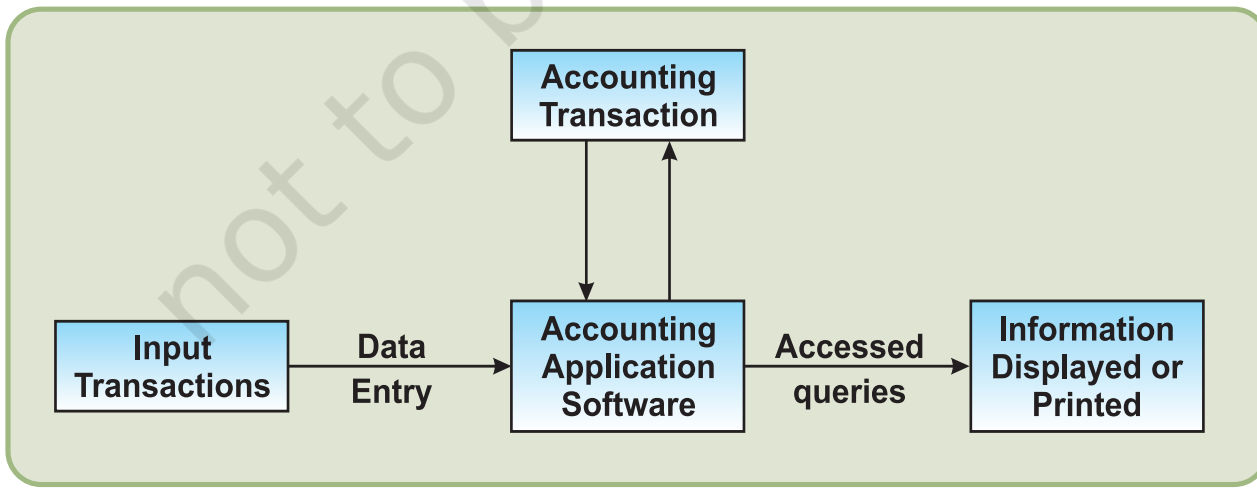

Figure 1.2 : Data to Information by Business Application Software

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Data and Information

Various elements (items) of accounting transactions are essentially the data items, which are processed through an accounting software to generate different sets of information in the form of accounting reports such as journals, ledger, etc.

A data-item (data element) is the smallest named unit of data in the *information system*. In accounting, a transaction consists of four data elements, such as name of account, accounting code, date of transaction and amount.

*The **transaction** is a record of inflow and outflow of resources.*

We may observe (Figure 1.3) how *data* (days worked and rate per day) is being (multiplied together) converted into *information* (amount to pay). The information may be viewed as data at one level; and when it is processed keeping in view the requirements of decision maker, it becomes the information at another level.

1.2 COMPONENTS OF CAS

The manual system of accounting is traditionally most popular method of keeping records of financial transactions of an organisation. Financial statements are the end products of the accounting process, which are prepared in accordance with ***Generally Accepted Accounting Principles (GAAP)***. The accounting cycle means the processes involved in identifying, measuring and communicating the information. The basic phases of the cycle are as follows:

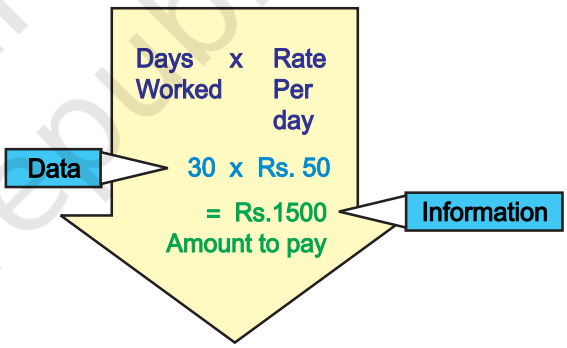

Figure 1.3

- Business transactions are analysed.
- The transactions are recorded in the journal.
- Journal entries are posted to the ledger accounts.
- A trial balance is prepared from balances of accounts.
- Accounts are reviewed and the necessary adjustments made.
- Adjustments are posted in the ledger to prepare adjusted trial balance.
- Adjusted trial balance is used to prepare the balance sheet and profit and loss account.
- Financial Statements are prepared from the finally adjusted ledger and balancing the accounts.

The above accounting cycle can be processed through the use of computers.

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1.3 SALIENT FEATURES OF CAS

Following are the salient features required for CAS software:

1.3.1 Simple and Integrated

CAS is designed to automate and integrate all the business operations, such as sales, finance, purchase, inventory and manufacturing. CAS is integrated to provide accurate, up-to-date business information rapidly. The CAS may be integrated with enhanced MIS (Management Information System), Multi-lingual and Data Organisation capabilities to simplify all the business processes of the organisation easily and cost-effectively.

1.3.2 Transparency and Control

CAS provides sufficient time to plan, increases data accessibility and enhances user satisfaction. With computerised accounting, the organisation will have greater transparency for day-to-day business operations and access to the vital information.

1.3.3 Accuracy and Speed

CAS provides user-definable templates (data entry screens or forms) for fast, accurate data entry of the transactions. It also helps in generalising desired documents and reports.

1.3.4 Scalability

CAS enables in changing the volume of data processing in tune with the change in the size of the business. The software can be used for any size of the business and type of the organisation.

1.3.5 Reliability

CAS makes sure that the generalised critical financial information is accurate, controlled and secured.

1.4 GROUPING OF ACCOUNTS

The increase in the number of transaction changes the volume and size of the business. Therefore it becomes necessary to have proper classification of data. The basic classifications of different accounts embodied in a transaction are resorted through accounting equation.

Accounting Equation

The modern accounting is based on double-entry system, which implies equality of assets and equities (liabilities and capital), i.e.

$$A = E$$

Where $\mathbf{E = L + C}$

Now $\mathbf{A = L + C}$

Where A = Assets

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E = Equities

C = Capital

L = Liabilities

Thus, **Assets = Liabilities + Capital**

In this equation the *Liabilities* means claims on the firm by *creditors* and the *Capital* means claims of *owners*. The claims of owners keep on changing due to success (profit) or failure (loss) of the firm. This is reflected by the income statement, which provides the summary of income and expenses of business for a given accounting period. Keeping this in view, the above equation can be re-written as:

Assets **=** **L**iabilities **+** **C**apital **+ (R**evenues **– E**xpenses**)**

Each component of the above equation can be divided into groups of accounts as follows:

Revenue *means inflow of resources, which results from the sale of goods or services in the normal course of business and increase in capital. Expenses imply consumption of resources in generating revenues.*

- **EQUITY AND LIABILITIES**
  - **Shareholder's Funds**
    - Share Capital
    - Reserves and Surplus
    - Money Received against Share Warrents
    - Share Application Money Pending Allotment
    - Non-Current Liabilities
    - Long Term Borrowings
    - Deferred Tax Liabilities (net)
    - Other Long Term Liabilities
    - Long Term Provisions
    - Current Liabilities
    - Short Term Borrowings
    - Trade Payables
    - Other Current Liabilities
    - Short Term Provisions

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- **ASSETS**
  1. **Non-Current Assets**
     - Fixed Assets
     - Tangible Assets
     - Intangible Assets
     - Capital Work-in-Progress
     - Intangible Assets Under Development
     - Fixed Assets held for Sales
     - Non Current Investments
     - Deferred Tax Assets (net)
     - Long Term Loans and Advances
     - Other Non-Current Assets
  2. **Current Assets**
     - Current Investments
     - Inventories
     - Trade Receivables
     - Cash and Cash Equivalents
     - Short Term Loans and Advances
     - Other Current Assets
- **REVENUES**
  - Sales
  - Other Income
- **EXPENSES**
  - Material Consumed
  - Salary and Wages
  - Manufacturing Expenses
  - Depreciation
  - Administrative Expenses
  - Interest
  - Selling and Distribution Expenses

There is a hierarchical relationship between the groups and its components. In order to maintain the hierarchical relationships between a group and its sub-groups, proper codification is required to ensure neatness of classification.

1.4.1 Codification of Accounts

According to *Concise Oxford Dictionary*, the term *code* means "a system of letter or figure with arbitrary meaning for brevity and for machine processing of information". Thus, *code* is an identification mark.

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Method of Codification

The coding scheme of Account-heads should be such that it leads to grouping of accounts at various levels so as to generate Position Statement (Balance Sheet) and Statement of Profit and Loss (Profit-Loss Account). For example, we may allot the codes for top-level grouping of accounts (forming the 1st digit of the Account Code) as follows:

		1	Equity and Liabilities
		2	Assets
		3	Revenues
		4	Expenses
Under Equity and Liabilities	:	11	Shareholder's funds
		13	Non-Current Liabilities
		14	Current Liabilities
Under Assets	:	21	Non-Current Assets
		23	Current Assets

Note: *The gap in code in the* ***2nd digit*** *(e.g. after 1, 3 instead of 2) is used to provide flexibility.*

The above codification scheme utilizes the hierarchy present (used) in grouping of accounts. Major advantage of such coding is that if the account codes are listed in ascending (i.e. increasing) order, these will be automatically listed as per the desired hierarchy.

1.4.1.1 Sequential Codes

In Sequential Code, numbers and/or letters are assigned in consecutive order. These codes are applied primarily to source documents such as cheques, invoices, etc. A sequential code can facilitate document searches. This process enables in either identification of missing codes (numbers) relating to a particular document or a relevant document can be traced on the basis of code.

For examples:

CODES	ACCOUNTS
CL001	GCERT LTD
CL002	XYZ LTD
CL003	ARIL CORPORATION OF INDIA

1.4.1.2 Block Codes

In a block code, a range of numbers is partitioned into a desired number of sub-ranges and each sub-range is allotted to a specific group. In most of the uses of block codes, numbers within a sub-range follow

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sequential coding scheme, i.e. the numbers increase consecutively. As an example, dealer codes for a trading firm could be as follows:

CODES	DEALER-TYPE
100 - 199	Small Pumps
200 - 299	Medium Pumps
300 - 399	Pipes
400 - 499	Motors

1.4.1.3 Mnemonic Codes

A mnemonic code consists of alphabets or abbreviations as symbols to codify a piece of information. SJ for "Sales Journals", HQ for "Head Quarters" are examples of mnemonic codes. Another common example is the use of alphabetic codes in Railways in identifying railway stations such as DLH for Delhi, NDLS for New Delhi, BRC for Baroda, etc.

1.4.2 Methodology to Develop Coding Structure and Coding

Let us assume that we have to do coding for students in one of seven schools run by a trust. The first step is to develop a coding structure (scheme), which will be used to develop individual codes for each student. Development of coding structure requires identification (finalisation) of hierarchy of schooling system and that of various attributes (parameters) associated with a student. A hierarchy in such a situation could be as follows:

Trust → School → Entry-year → Stream → Class → Section → Student

The "Stream" could be science stream, commerce stream or general Stream. A class may be divided into more than one section when the number of admitted students increases the class capacity. We can decide the coding structure after the following considerations:

- As there is only one Trust, no provision is required in the coding structure to accommodate for Trust. Had there been multiple trusts under one organisation running a number of schools, the provision of Trust code would have been necessary in the coding structure.
- Assuming that the maximum number of Schools is not likely to exceed 99, we can allocate 2 digits for School.
- Two digits can be allocated for the Entry-year. Entry-year is necessary to maintain records of old students.
- For Stream, 1 digit is sufficient. If Stream is not relevant (applicable) as is the case for primary and secondary classes, the value 0 will be considered for Stream.
- To accommodate Classes, 2 digits are sufficient.

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- Number of Sections in a class will not exceed 9. Hence, 1 digit is sufficient for Section.
- Two digits will be sufficient for number of Students within a section of a class, assuming that not more than 99 Students will ever be put in a section of a class.

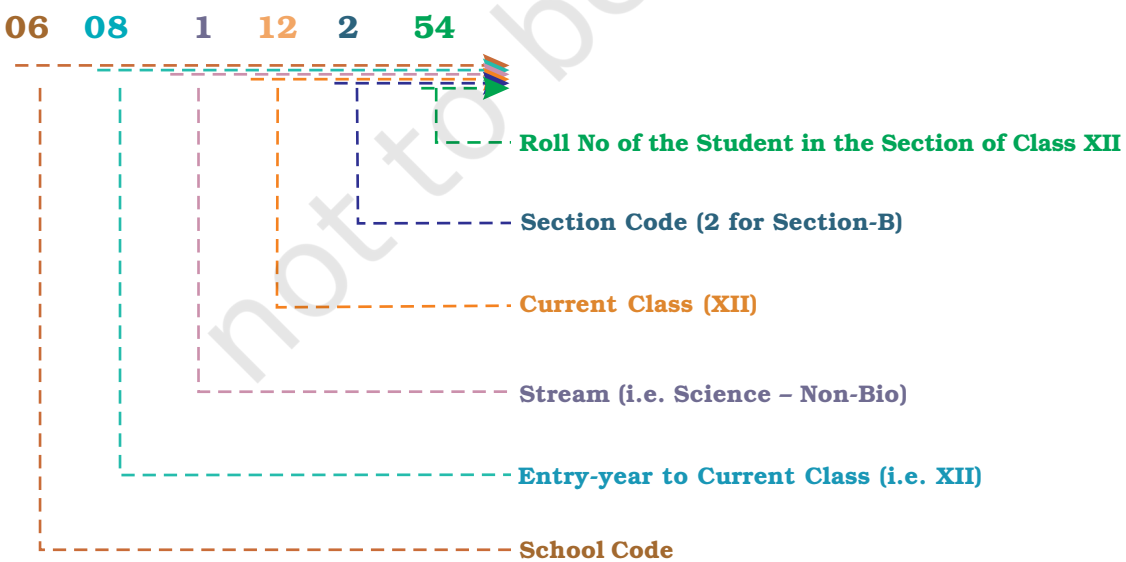
The coding structure for Students will be as follows based on the above considerations:

School	2 Digits
Entry-year	2 Digits
Stream	1 Digit
Class	2 Digits
Section	1 Digit
Student	2 Digits

Thus, if we allocate 10 digits codes to a student, we shall be able to get the following details of a student right from the code itself :

- Which stream in which school the student is studying (had studied)?
- What were the class and its section and in which year the student had entered this class?
- List of all students who has entered a school in a given year, etc.

Once the coding structure is decided as described above, allotting of code becomes easy. For example, if a student with a Roll No. 54 had entered Section-B of Class XII in Year 2008 opting for Science Stream (Non-Biology Group) (Stream Code: 1) in the 6th School run by the Trust. Its code would be as follows:



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1.5 USING SOFTWARE OF CAS

There are two basic activities in using software of CAS – One time activities and recurring activites. One time activities include creation of Organisation details, accounting year, type of ledger (also called "creation of master files"), etc. While reccuring activities include entry of transactions and generation of reports. The transactions are recorded on the basis of Cash Vouchers, Bank Vouchers, Purchase Vouchers, Sales Vouchers, Journal Vouchers, etc. Reports include generation of Day books, Ledgers, Trial Balance, Statement of Profit and Loss, Position Statement and Cash Flow Statement. (Please refer to Chapter 5 for details)

Security Features of CAS Software

Every accounting software ensures data security, safety and confidentiality. Therefore every, software provides the following:

- Password Security
- Data Audit
- Data Vault

Password Security: Password is a mechanism, which enables a user to access a system including data. The system facilitates defining the user rights according to organisation policy. Consequently, a person in an organisation may be given access to a particular set of a data while he may be denied access to another set of data.

Password is the key (code) to allow the access to the system.

Data Audit: This feature enables one to know as to who and what changes have been made in the original data thereby helping and fixing the responsibility of the person who has manipulated the data and also ensures data integrity. Basically, this feature is similar to Audit Trail.

Data Vault: Software provides additional security through data encryption.

Encryption *essentially scrambles the information so as to make its interpretation extremely difficult (almost impossible). Thus,* **Encryption** *ensures security of data even if it lands in wrong hands, because the receiver of data will not be able to decode and interpret it.*

1.6 ADVANTAGES OF CAS

Following are the advantages of Computerised Accounting System (CAS):

1. Timely generation of reports and information in desired format.
2. Efficient record keeping.
3. Ensures effective control over the system.

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4. Economy in the processing of accounting data.
5. Confidentiality of data is maintained.

1.7 LIMITATIONS OF CAS

Following are the limitation of CAS software:

1. Faster obsolescence of technology necessitates investment in shorter period of time.
2. Data may be lost or corrupted due to power interruptions.
3. Data are prone to hacking.
4. Un-programmed and un-specified reports cannot be generated.

1.8 ACCOUNTING INFORMATION SYSTEM (AIS)

Accounting Information System (AIS) and its various sub-systems may be implemented through Computerised Accounting System. The subsystems of AIS are briefly described below (Fig. 1.4)

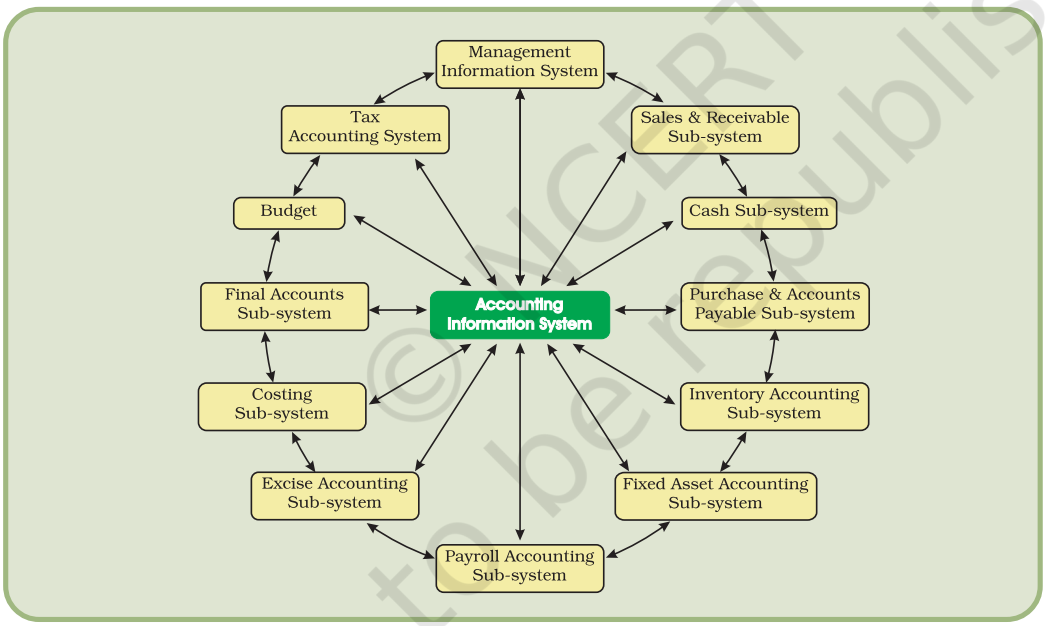

Figure 1.4 : The sub-systems of Accounting Information System

1.8.1 Cash and Bank Sub-system

It deals with the receipt and payment of cash both physical cash and electronic fund transfer. Electronic fund transfer takes place without having the physical entry or exit of cash by using the credit cards or electronic banking.

1.8.2 Sales and Accounts Receivable Sub-system

It deals with recording of sales, maintaining of sales ledger and receivables. It generates periodic reports about sales, collections made,

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overdue accounts and receivables position as also ageing schedule of receivables/debtors.

1.8.3 Inventory Sub-system

It deals with the recording of different items purchased and issued specifying the price, quantity and date. It generates the inventory position and valuation report.

1.8.4 Purchase and Accounts Payable Sub-system

It deals with the purchase and payments to creditors. It provides for ordering of goods, sorting of purchase expenses and payment to the creditors. It also generates periodic reports about the performance of suppliers, payment schedule and position of the creditors.

1.8.5 Payroll Accounting Sub-system

It deals with payment of wages and salary to employees. A typical wage report details information about basic pay, dearness allowance, and other allowances and deductions from salary and wages on account of provident fund, taxes, loans, advances and other charges. The system generates reports about wage bill, overtime payment and payment on account of leave encashment, etc.

1.8.6 Fixed Assets Accounting Sub-system

It deals with the recording of purchases, additions, deletions, usage of fixed assets such as land and buildings, machinery and equipments, etc. it also generates reports about the cost, depreciation, and book value of different assets.

1.8.7 Expense Accounting Sub-system

This sub-system records expenses under broad groups such as manufacturing administrative, financial, selling and distributions and others.

1.8.8 Tax Accounting Sub-system

This sub-system deals with compliance requirement value-added tax (VAT), excise, customs and income tax. This sub-system used in large size organisation.

1.8.9 Final Accounts Sub-system

This subsystem deals with the preparation of Profit and Loss accounts, Balance Sheet and cash flow statements for reporting purposes.

1.8.10 Costing Sub-system

It deals with the ascertainment of cost of goods produced. It has linkages with other accounting sub-systems for obtaining the necessary information about cost of material, labour, and other expenses. This system generates information about changes in the cost that takes place during the period under review.

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1.8.11 Budget Sub-system

It deals with the preparation of budget for the coming financial year as well as comparison with the current budget of the actual performances.

1.8.12 Management Information System

Management Information System (MIS) deals with generation and processing of reports that are vital for management decision-making. The Information system should be so flexible as to provide customised reports to support various managerial functions such as planning, organising, staffing, oversight, control and decision-making including operational, functional and strategic nature.

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Summary

- In Computerised Accounting System, accounting transactions are processed using computer system. A computer system includes hardware and software. Hardware includes Central Processing Unit (CPU), Random Access Memory (RAM), Monitor (Screen), Keyboard, Mouse, Hard Disk and CD/DVD for mass storage of data and Printer, etc. Software consists of set of instructions. Software can either be a System Software (a part of Computer System) or an Application Software. CAS uses Accounting Software. Accounting Software (such as Tally) is an example of Application Software.
- Coding (for Account Head, Budget Head, Cost Centres, etc) is required in CAS. Coding first requires development of its structure. Coding Structure should be compatible with inherent structure of the element to be coded. For example, Account Head coding requires a hierarchical structure to progressively summarise the accounting information as per the requirements of Balance Sheet and Profit and Loss Account.
- Advantages of CAS include speed, efficiency, arithmetic accuracy, cost saving, confidentiality of data.
- Limitations of CAS include provision for (a) fast obsolescence of technology, (b) data loss due to either power interruptions or damage to hard disk, (c) virus and other security hazards.
- Accounting Information System is an integration of various sub-systems such as: (i) cash sub-system, (ii) sales and accounts receivable sub-system, (iii) inventory sub-system, (iv) purchase and accounts payable sub-system, (v) payroll accounting sub-system, (vi) fixed asset accounting sub-system, (vii) expense accounting sub-system, (viii) tax accounting sub-system, (ix) final accounts sub-system, (x) costing sub-system, (xi) budget sub-system, (xii) management information sub-system.

EXERCISES

Q1. Multiple Choice Questions

1. The components of Computerised Accounting System are :
   (a) Data, Report, Ledger, Hardware, Software;
   (b) Data, People, Procedure, Hardware, Software;
   (c) People, Procedure, Ledger, Data, Chart of Accounts;
   (d) Data, Coding, Procedure, Rules, Output.
2. The Computerised Accounting System refers to :
   (a) Printing of Balance Sheet and Profit and Loss Accounts using computer;
   (b) Processing of accounting transaction through computer and produce records and reports;
   (c) Processing of accounting related data and printing reports;
   (d) None of the above.
3. The components of Computerised Accounting System refers to :
   (a) Business transactions are analysed, transactions recorded, prepare trial balance, preparation of balance sheet and profit and loss account;
   (b) From data entry to preparation of final statements;
   (c) Transformation of manual accounting system to CAS;
   (d) None of the above.
4. The CAS should be
   (a) Simple and integrated, transparent, accurate, scalability, reliability;
   (b) Complex, Accurate, Transparent, Faster to work;
   (c) Able to transform the manual accounting system to computerised accounting system;
   (d) None of the above.
5. The Grouping of Accounts means the classification of data from :
   (a) Asset, liabilities and capital
   (b) Asset, capital, liabilities, revenue and expenses
   (c) Asset, owners equity, revenue and expenses
   (d) None of the above.
6. Codification of Accounts required for the purpose of :
   (a) Hierarchical relationship between groups and components
   (b) Data processing faster and preparing of final accounts
   (c) Keeping data and information secured
   (d) None of the above.

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7. Method of Codification should be :
   (a) Such that it leads to grouping of accounts
   (b) An identification mark.
   (c) Easy to understand, cryptic, and leads to grouping of accounts
   (d) None of the above
8. The need of Codification is :
   (a) The Encryption of data
   (b) The Generation of mnemonic code
   (c) To secure the accounts, reports, etc.
   (d) Easy to process data, keeping proper records
9. What is the activity sequence of the basic information processing model?
   (a) Organise data, process data, and collect data
   (b) Collect data, organise and process data, and communicate information
   (c) Process data, organise data, and collect data
   (d) Organise data, collect data, and communicate information
10. What are internal controls designed to do?
   (a) safeguard assets and optimise the use of resource
   (b) only achieve maximum revenue
   (c) only safeguard assets
   (d) only ensure accurate accounting records
11. What is a firm's payment to a supplier for merchandise inventory recorded in?
   (a) Cash payment journal
   (b) Purchases journal
   (c) Sales journal
   (d) Cash receipts journal
12. Where are amounts owed by customers for credit purchases found?
   (a) accounts receivable journal
   (b) general ledger
   (c) sales journal
   (d) accounts receivable subsidiary ledger

Q2. Answer the following Questions

1. Why the computerisation of Financial Accounting is required and why is it useful?
2. What is coding? Why codification is required for an Accounting System?
3. What are the salient features of Computerised Accounting Software?

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4. What are the phases in an accounting cycle?
5. Write differences between data and information with examples?
6. Explain various types of coding methods and the situations where each coding method is best suited?
7. Define the term transaction and elaborate with the help of examples how the transaction will be shown in chart of accounts by hierarchical grouping?
8. What is a chart of accounts? How is it arranged?
9. What is meant by Revenue and Expenses?
10. What are the limitations of CAS?
11. What are the advantages of CAS?
12. What is encryption and how is it helpful in CAS?

Q3. Skill Review

1. Topic of debate: "Intentional manipulation of accounting records is much easier in computerised accounting system than in manual accounting system".

   Do this exercise in the class forming group of 4 students to form a team and do the presentation in the class?

2. Develop a **coding structure** for inventory items based on the following information: There are around 7000 items, which are grouped under 37 major categories. Each major category is further sub-divided into 15-40 sub-categories. Within a sub-category, the number of items will never exceed 1000.

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Answers

1. b	**2.** b	**3.** a	**4.** a	**5.** b	**6.** a
7. a	**8.** a	**9.** b	**10.** a	**11.** a	**12.** d

SPREADSHEET

2

12127CH02

Learning Objectives

After studying this chapter you will be able to understand:

- *Concept of Spreadsheet and its features.*
- *How to use a Spreadsheet.*

Introduction

A *spreadsheet* is a configuration of rows and columns. Rows are horizontal vectors while columns are vertical vectors. A spreadsheet is also known as a worksheet. It is used to record, calculate and compare numerical or financial data. Each value can either be an independent (i.e. *basic*) value or it may be derived on the basis of values of other variables. The *derived value* is the outcome of an arithmetic expression and/or a function (i.e. a formula).

Spreadsheet application (sometimes referred to simply as spreadsheet) is a computer program that allows us to add (i.e. enter) and process data. We shall understand spreadsheet with the help of *MS-Excel* (or simply, Excel), which is one of the Microsoft Office Suite of software.

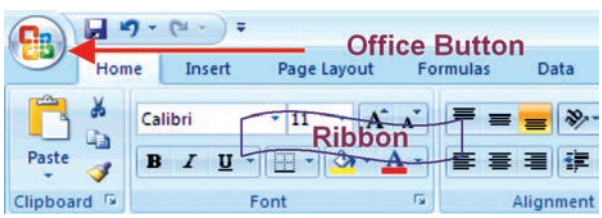

Figure 2.1

The current version of Excel is Excel 2007 and has a completely redesigned user interface. The Excel 2007 is now designed with a series of horizontal tabs known as "Ribbon" (Figure 2.1). These tool bars are changed using tabs at the top. This layout is very easy to use than the previous

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versions of Excel. On clicking with left button of mouse at **"Office Button"** ; we will be able to open an old workbook or create a new one or can save the workbook or can print which were earlier available in previous version of Excel in File menu.

2.1 BASIC CONCEPTS OF SPREADSHEET

A file in Excel is known as a "Workbook". A workbook is a collection of a number of "Worksheets" (Figure 2.2). By default, three sheets, namely Sheet 1, Sheet 2, and Sheet 3 are available to users. At a time, only one worksheet can be made as "Active Worksheet" and that worksheet is available to a user for carrying out operations. An active worksheet's name will be shown in bold letters in the "Sheet Tab" at the bottom left of the screen. Additional sheets can be added, if required, by clicking on the icon (which works as **Insert ! *Worksheet***).

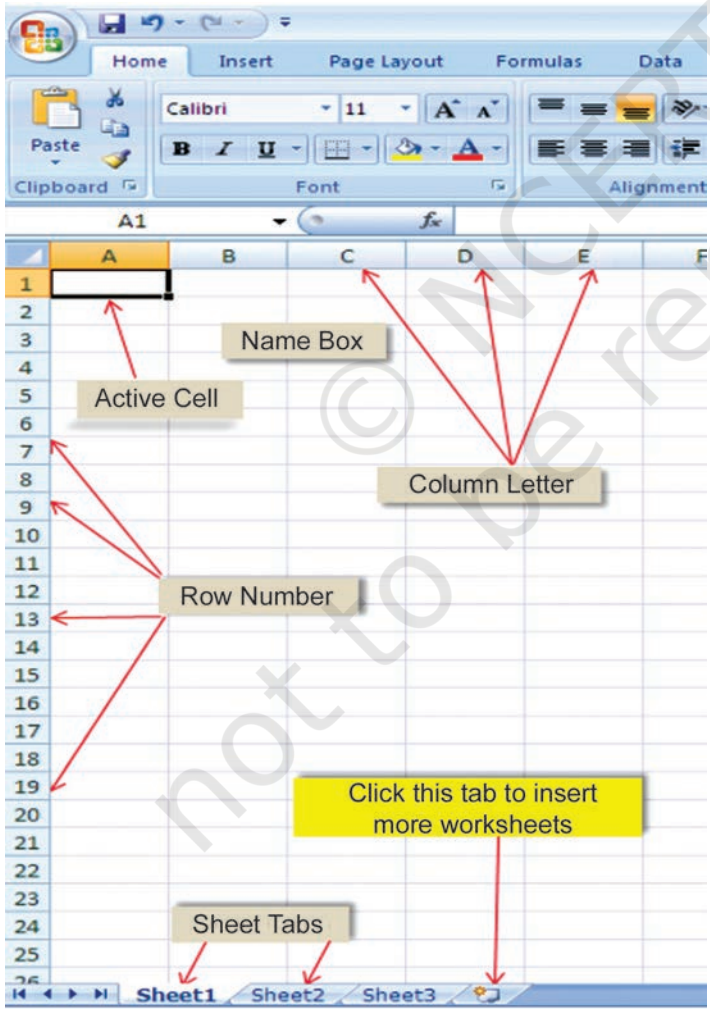

Figure 2.2

The Sheet names can be changed, if required, by right-clicking the mouse over the Sheet1 or Sheet 2 or Sheet 3 after selecting and pointing it on the sheet name (which is to be changed) and selecting "Rename" option.

Box 2.1

Basic and Derived Values

If quantity (Q) of an item is purchased at a price (P), the value of that item (V) is derived as follows:

$$V = Q \times P$$

Here, the values P and Q are **Basic Values.** *While V is the* **Derived Value** *as it is obtained by multiplying Q with P. The expression (Q×P) is called as* **arithmetic expression**. *Additional examples of* **arithmetic expressions** *are given later in this chapter.*

Note: *In general, an* **arithmetic expression** *may contain one or more* **functions**.

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Rows are numbered numerically from top to bottom while ***Columns*** are referred by alpha characters from left to right. In Excel 2007, there are 65536 ***Rows*** which are numbered as 1, 2, 3, ... 65,536. These numbers are shown on the left most portion of the worksheet. ***Columns*** (total 256 in Excel) are identified by letters, such as A, B, C,.. AA... IV, and are shown on the horizontal box just above Row 1. Thus, there are 65,536 x 256 = 1,65,00,000, approximately cells, which is indeed a huge work area, sufficient for all application requirements (Figure 2.3) in one sheet.

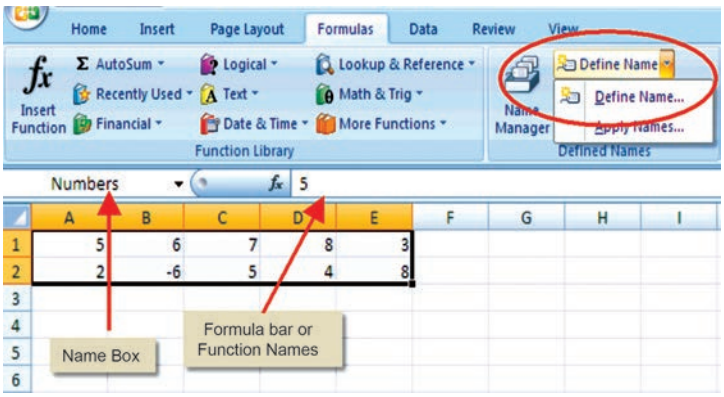

Figure 2.3

In a spreadsheet, a value or function or an arithmetic expression is recorded in a ***cell***. The intersection of a ***row*** and a ***column*** is called a ***cell.*** A ***cell*** is identified by a combination of a letter and a number corresponding to a particular location within the spreadsheet. For example, the first cell of a worksheet is identified as A1 as it shown in Figure 2.2 at row 1 and column (A). When we start Excel, the pointer (cursor) points to the first cell, i.e. A1, and this cell is called the ***Active Cell***. We can move around a worksheet through four arrow keys (i.e. left, right, up, down as shown in Figure 2.4). For example, the cell having address as G8 correspond to 8th row under G column. Each cell thus has a unique identification called as ***cell address***.

Cell Reference — *A cell reference identifies the location of a cell or group of cells in the spreadsheet also referred as a cell address. Cell references are used in formulas, functions, charts, other Excel commands and also refer to a group or range of cells.* ***Ranges*** *are identified by the cell references of the cells in the upper left (cell A1) and lower right (cell E2) corners in Figure 2.3. The ranges are identified using colon (:) e.g. A1: E2 which tells Excel to include all the cells between these start and end points. By default cell reference is* **relative***; which means that as a formula or function is copied and pasted to other cells, the cell references in the formula or function change to reflect the new location. The other cell reference is* **absolute** *cell reference which consists of the column letter and row number surrounded by dollar ($) signs e.g. $C$4. An absolute cell reference is used when we want a cell reference to stay fixed on specific cell, which means that when a formula or function is copied and pasted to other cells, the cell references in the formula or function do not change. A* **mixed reference** *is also a cell reference that holds either row or column constant when the formula or function is copied to another location e.g., $C4 or C$4.*

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The mouse is used for all the operations required and for navigation in worksheet (or workbook) except data entry; but some of the important operations and common navigations can be performed by using key strokes (as given below). It is better to understand and know all the keys of keyboard and key strokes. Pressing a key is called key stroke but to fulfill one command for operation in the worksheet some time we require pressing two keys together to get one key stroke (Figure 2.4)

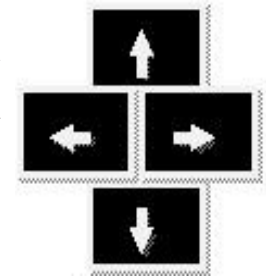

Figure 2.4

Movement	***Key Stroke (Press key)***
One cell down	Down arrow key **(↓)** or ***Enter*** key
One cell up	Up arrow key **(↑)**
One cell left	Left arrow key **(←)**
One cell right	Right arrow key **(→)** or ***Tab*** key

The other navigational and operational strokes are used for faster cursor movement than one cell at a time with cluster of filled cells. Cluster of filled cells implies a set of consecutive cells in a row or in a column having some data.

Navigating In (i.e. Moving around) The Worksheet

Movement	***Key Stroke (Press key)***
Top of Worksheet (cell A1)	***CTRL* + *HOME*** (i.e. Keep ***CTRL*** key pressed and then press ***HOME*** key
The cell at the intersection of the last row and last column containing data	***CTRL* + *END*** keys
Moving consecutively to the first and the last filled cells of clusters of filled cells in a row by successive pressing of ***CTRL* + Right arrow key** (→) *or* else ***END* + Right arrow key** (→)	***CTRL* + Right arrow key** (→) or else ***END* + Right arrow key** (→)
Moving consecutively to the first and the last filled cells of a cluster of filled cells in a column by successive pressing of ***CTRL* + Down arrow key** (↓) or else ***END* + Down arrow key** (↓)	***CTRL* + Down arrow key** (↓) or else ***END* + Down arrow key** (↓)
Beginning of the Row	***HOME* key**
Beginning of the Column	

The data that is entered in a cell may be either numeric or alpha-numeric or a date. As a data is typed in a cell, Excel is able to make out its type (i.e. numeric or alpha-numeric or date) depending on the nature of value typed in a cell.

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If the value is entered as 306, *its type is automatically taken as Numeric; if the value is entered as* Asset, *its type will be taken as alpha-numeric; while if the value is entered as 12/07/08, its type is taken as Date. (refer figure 2.5)*

The first step required to use Excel for a specific application is to decide what **values** will be entered in which cells and also the cells which will be used for entering the relationships. Once we have decided about the cells which are to be used for the relationships; the **formulas (arithmetic expressions)** and data can be entered. *(See Box 2.1 at page18)*

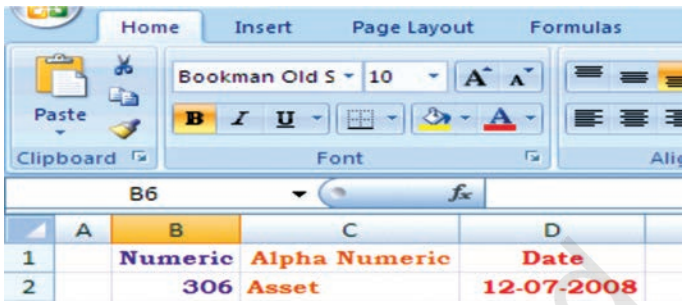

Figure 2.5

Values

A value can be entered from the computer keyboard by directly typing into the cell itself. Alternatively, a value can be based on a formula (derived), which might perform a calculation, display the current date or time, or retrieve external data such as a stock quote or a database value.

*The **value rule** according to computer scientist **Alan Kay** implies in spreadsheet. It states that a cell's value relies solely on the formula that user has typed into the cell. The formula may rely on the value of other cells, but those cells are likewise restricted to user-entered data or formulas. There are no **'side effects'** to calculating a formula: the only output is to display the calculated result inside its occupying cell. There is no natural mechanism for permanently modifying the contents of a cell unless the user manually modifies the cell's contents. Sometime it is called a limited form of first-order functional programming.*

A simple example of a spreadsheet application (Figure 2.6) is to calculate compound interest and maturity amount to be paid on fixed deposit. The first step (i.e. the Planning Step) is to define six cells with column headings:

- Principal Amount (PA in column B)
- Rate of Interest (r in column C)
- Period in years (NY)
- Period of Compounding (CP in column D)
- Compound Interest (CI in column F)
- Maturity Amount (MA in column E)

The formula for Maturity Amount (MA) and Compound Interest (CI) computations considering yearly compounding of interest are as follows:

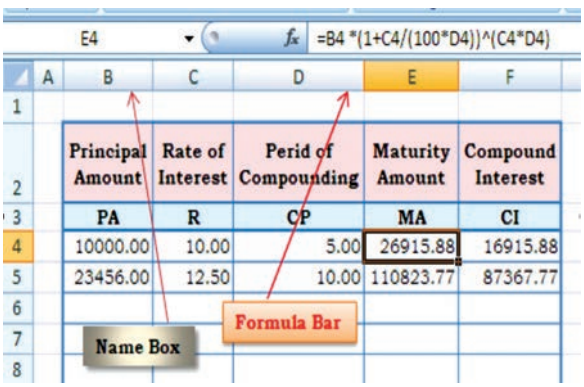

Figure 2.6

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MA = PA * (1 + R / (100 * CP)) ^ (R * CP)
CI= MA – PA

Now, we can decide the layout of the worksheet for (compound) interest calculation as shown in Figure 2.6.

It may be observed that the basic values are entered in cells (as in figure 2.6 the cells are B4, C4 and D4); the derived values (as in Figure 2.6 the cells are E4 and F4) are automatically computed (using above formula) and shown in ***formula bar***. In case any basic values are modified, the derived values as a result are revised accordingly. This feature of Spreadsheets enables us to study various ***what-if scenarios***.

*A **what-if scenario** is used to generate a number of alternatives to examine the cause (if) and effect (what). Thus, it helps in analysing the impact of changes due to variations in one or more input values. Taking the above example, if all the other values are kept same, one can see how different rates of interest and different periods of compounding would affect the Compound Interest and the Maturity Amount to be received.*

Before proceeding further for the above example we have to understand some of the basic terminologies and features of the spreadsheet such as:

2.1.1 Labels

A text or especial **character** will be treated as labels for rows or columns or descriptive information. Labels cannot be treated mathematically-multiplied, subtracted, etc. Labels include any cell contents beginning with A-Z e.g., in the above Figure 2.6 **Principal Amount**, **Rate of Interest**, **Maturity amount**, etc. will be taken as labels.

2.1.2 Formulas

The formula means a mathematical calculation on a set of cells. Formulas must start with an = sign (equal to sign), e.g. in the Figure 2.7 the cell E3 will have formula = D1+E1/F1*G1 which gives value 16.

When a cell contains a **formula**, it often contains ***references*** to other cells. Such a ***cell reference*** is a type of variable. Its value is the value of the referenced cell or some derivation of it. If that cell in turn references other cells, the value depends on the values of those.

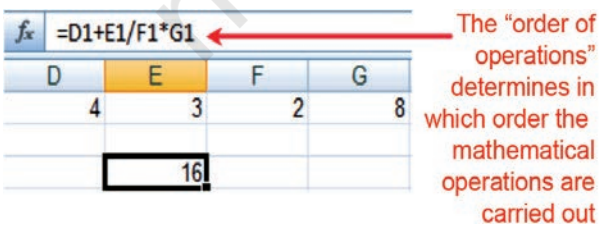

Figure 2.7

By convention, the left hand side of equal to sign in a **formula** is normally considered is calculated and displayed in cell E3.

A formula identifies the calculation needed to place the result in the cell it is contained within. A cell E3 containing a formula, therefore it has two display

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components; the formula itself and the resulting value. The formula is shown only when the cell is selected by "clicking" the mouse over a particular cell; otherwise it contains the result of the calculation (in this case 16).

The arithmetic operations and complex **nested conditional** ***(what-if scenario)*** operations can be performed by spreadsheets which follow ***order of mathematical (expression) operations rules***.

Order of mathematical operations (expressions)

Computer math uses the rules of Algebra. Any operation(s) contained in brackets will be carried out first followed by any exponents.

After that, Excel considers division or multiplication operations to be of equal importance, and carries out these operations in the order they occur left to right in the equation.

The same goes for the next two operations – addition and subtraction. They are considered equal in the order of operations. Whichever one appears first in an equation, either addition or subtraction is the operation carried out first.

Three easy ways to remember the order of operations is to use the acronym:

GEMS	**PEMDAS**	**BEMDAS**
( ) **G**rouping	**P**lease - ( )parenthesis	( ) **B**rackets
^ **E**xponents	**E**xcuse - ^ exponents	^ **E**xponents
* **M**ultiplication :	**M**y - * multiply	* **M**ultiplication
/ or Division :	**D**ear - / divide	/ **D**ivision
- **S**ubtraction :	**A**unt - + add	+ **A**ddition
+ or Addition :	**S**ally - - subtract	- **S**ubtraction

A **spreadsheet** without any formulas is a collection of data which are arranged in rows and columns (a database) like a calendar, timetable or simple list, etc. There is a Formula tab on Excel ribbon (Figure 2.8(a) which contains four sections, functions library, defined names, formula auditing and calculation.

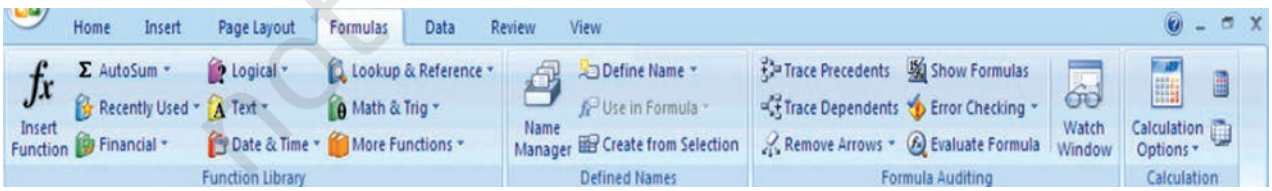

Figure 2.8(a)

2.1.3 Functions

A function is a special key word which can be entered into a cell in order to perform and process the data which is appended within brackets.

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There is a function button on the formula toolbar (f_x) (figure 2.8(b); when we click with the mouse on it; a function offers assistance and useful prompts into a spreadsheet cell. Alternatively we can enter the function directly into the formula bar. A function involves four main issues:

- Name of the function
- The purpose of the function
- The function needs what argument(s) in order to carry its assignment.
- The result of the function.

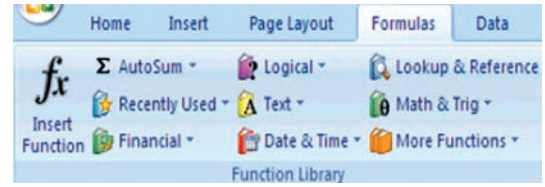

Figure 2.8(b)

A function is a built in set of formulas which starts with an = "equal to sign" such as = **FunctionName(Data).** The data (or argument in proper terminology) includes a range of cells.

SUM (), AVERAGE () and COUNT () are common functions and relatively easy to understand. They each apply to a **range of cells** containing numbers (or blank but not text) and return either the arithmetic total of the numbers, the average mean value or the quantity of values in the range.

For Example: The **SUM** or **AutoSum (∑)** function is the most basic and one of the common user functions. It is used to get the addition of

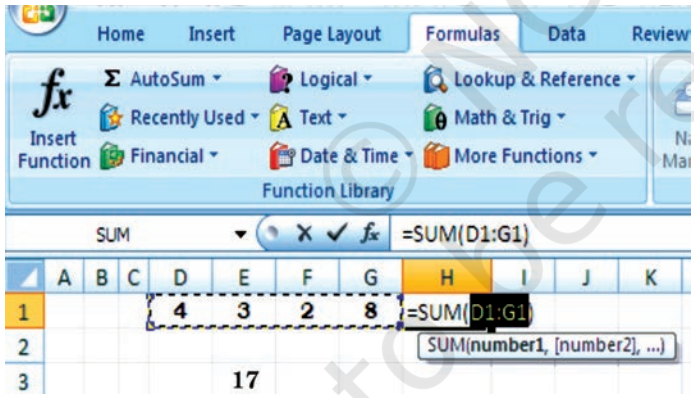

Figure 2.9(a)

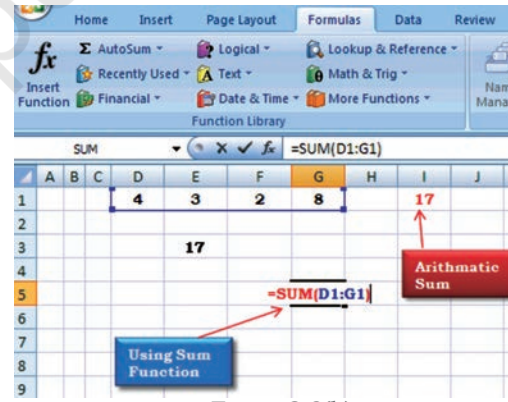

Figure 2.9(b)

various numbers or the contents of various cells. On the ribbon (Figure 2.9(a)) the **AutoSum (∑)** button can be use directly for summation of values from cells. Once we click the **AutoSum (∑)** at cell H1, the function adds the contents of cell range D1 to G1 and displays the answer that we want to get the sum of. If we want answer in the cell G5 (Figure 2.9(b) use the mouse to click in the cell G5 and click AutoSum button then from keyboard type range of the cells D1:G1; the answer 17 will appear in cell G5; or we can write directly the complete function = SUM (D1: G1) appears in the formula bar above the worksheet. The AutoSum function also includes other series based functions such as AVERAGE, MIN, MAX and COUNT.

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There are twelve different categories of functions available in Excel 2007 displayed on the ribbon (Figure 2.8) which are classified as per the usage e.g. The Financial, Date and Time, Lookup and References, Database, Text and Logical functions are useful in Computerised Accountancy and will be explained later subsequently.

Naming Ranges – IF Functions – Nested IF Functions

As mentioned earlier, we will now learn the arithmetic operations and complex **nested conditional *(what-if scenario)*** using name ranges, absolute cell references and mixed references in following sections.

Naming Cells and Ranges

Naming ranges in Excel will save time for writing complex formulas. The name can be used in place of cell range whenever reference it e.g. in D3 we have = SUM (**B1:F1**) (Figure 2.10)

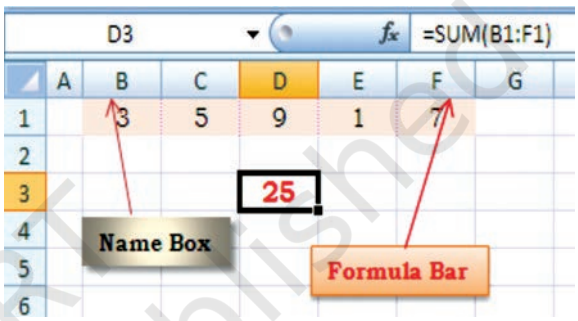

Figure 2.10

The cell referenced in the function B1:F1 can be replaced with a descriptive name say ***Numbers*** (name range) which is easier to remember and in D3 it will be = SUM (**Numbers**)

Behind the ***Numbers*** *Excel* is hiding cell references, we will see how it works now.

The steps are for defining Name Ranges are as follows:

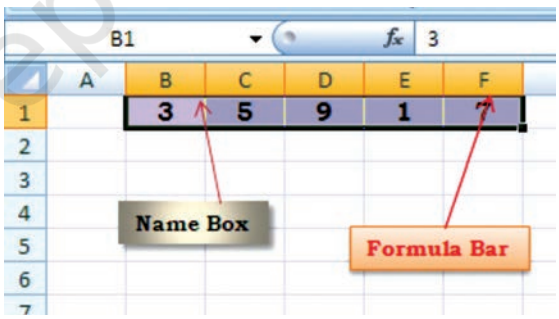

Figure 2.10(a)

1. Select the cell(s) which are to be named (such as B1:F1 in Figure 2.10(a)).
2. Click on the ribbon on formula tab.
3. Select **Define Name** (Figure 2.10(b) option on the ribbon and click it.
4. This will provide a dialogue box will be opened as shown in Figure 2.10(c) to click Define Name (another option Apply Names is for previously created Range Names to select) (Figure 2.10(d)).

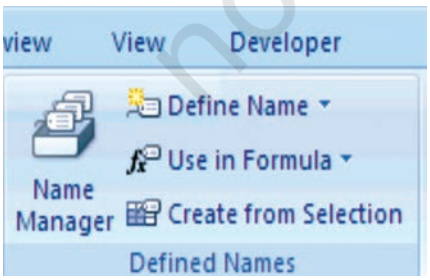

Figure 2.10(b)

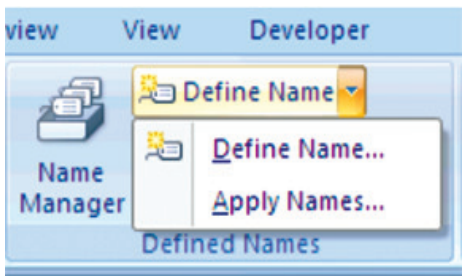

Figure 2.10(c)

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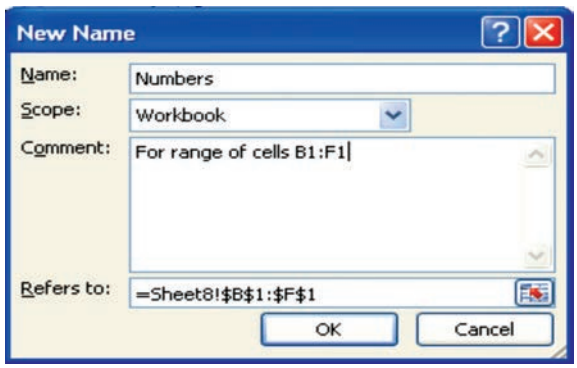

Figure 2.10(d)

5. This will display a dialogue box as New Name shown in Figure 2.10(d). It will provide a window **"Name"** in which type **"Numbers"** which will represent cell ranges **$B$1:$F$1** as shown in be "Refers to" window.
6. Click **OK** on the New Name dialogue box which returns to the spreadsheet. Notice that the Name Box having our heading "Numbers".

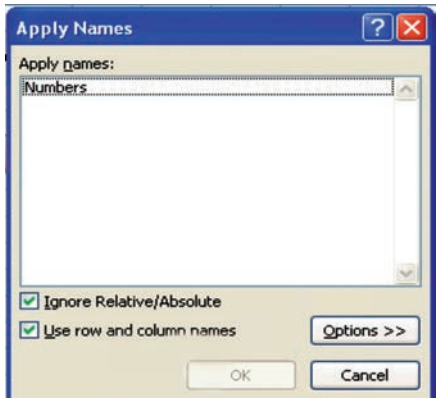

Figure 2.10(e)

7. To apply this name in cell D3 for summation from B1:F1 click on Apply Name and a dialogue box will be opened then click on a Name Range – Numbers (Figure 10(e)). The D3 will be having =SUM (Numbers) And will display the result (Figure 10(f)). The named range can be used with other Functions such as AVERAGE (), SUMIF () etc.

Now we will use a summation of numbers using condition in the cell D3. Type the formula **= SUMIF (Numbers,"<6)** and the answer will be 9 (for the Numbers less than 6 in the named range B1:F1) (Figure 2.10(f)).

Let us understand with the help of another example in which we will be using two Named Ranges (Figure 2.11) namely Monthly_Totals for cells B2:B5

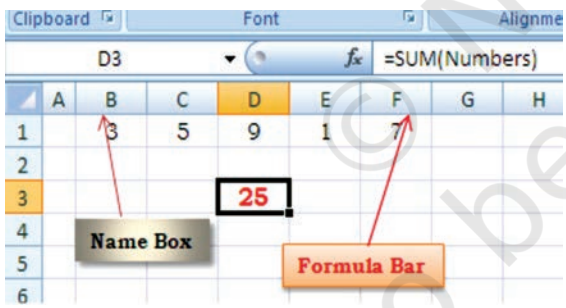

Figure 2.10(f)

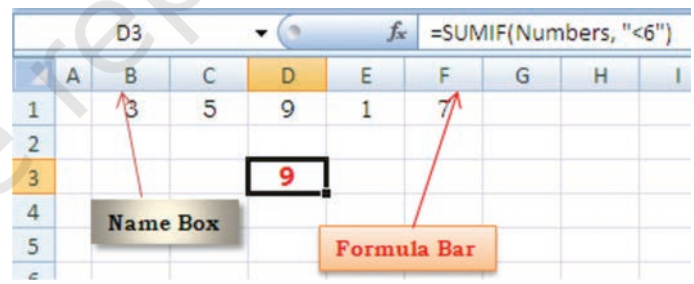

Figure 2.10(g)

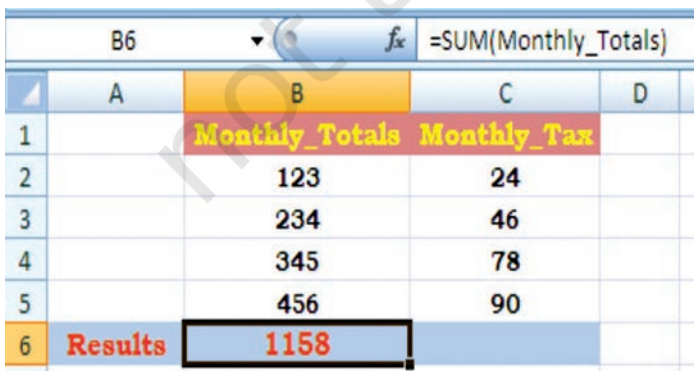

Figure 2.11

and Monthly_Tax for cells C2:C5 respectively created as described above.

The cell B6 will have value 1158 by using function as =SUM (Monthly_Totals).

Similarly in Figure 2.11(a) if we use **Autosum Function** (∑) from the formula tab of the ribbon at the cell C6; the function will include the Named Ranges as an argument and gives the result 238.

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We will now use these two Named Ranges to calculate the **Balance** (in cell B7) after using the formula tax from monthly totals. Let us give **Total_of_Month** is the Named Range for cell B6 and similarly, the **Total_of_Tax** is the Named Range for cell C6. With these two Named Ranges; the cell B7 will have the difference of these two amounts and will be written (Figure 2.11(b)) as **= Total_of_Month – Total_of_Tax** .

To prevent its recalculation and maintain the present calculated value as shown in the cells B6, C6 and B7 respectively (Figure 2.11(b) we can freeze the formula using Paste Special command. The following steps are required:

1. Select the cell (s) that contains the formula e.g. B6:C6, B7 (Figure 2.11(b)
2. Click on Home Tab and select Copy symbol (Figure 2.11(c)) to click, this will copy the values and formulas of the cells (Figure 2.11(d)).
3. Click on **Paste** tab and select **Paste Special**.
4. In the **Paste Special** box (Figure 2.11 (d)), under paste select the radio button next to **Values** and click **OK**. This will permanently remove the formula from the workbook.

In continuation to our need of *what-if-scenario* now we will learn about an important logical function **IF Function**. This function can be evoked from formula tab on the ribbon. This function returns one value if a specified condition evaluated to **TRUE** and another value if it evaluates to **FALSE.** We will learn more about the usage of functions in the business applications subsequently; there are a large selection of if functions available. An IF function has the following format:

IF (logical_test, value_if_ture, value_if_false) where

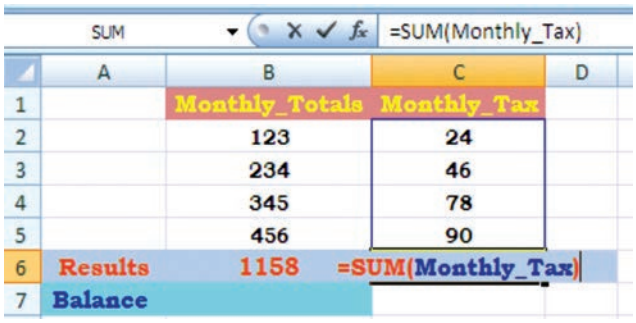

Figure 2.11(a)

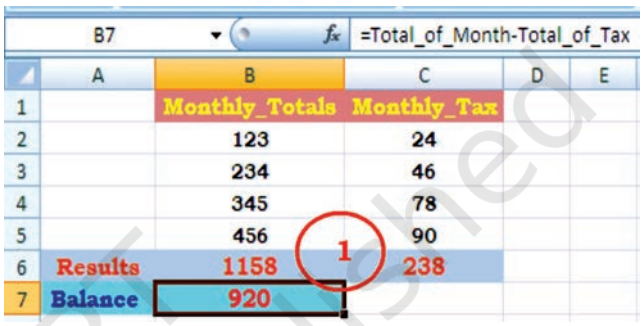

Figure 2.11(b)

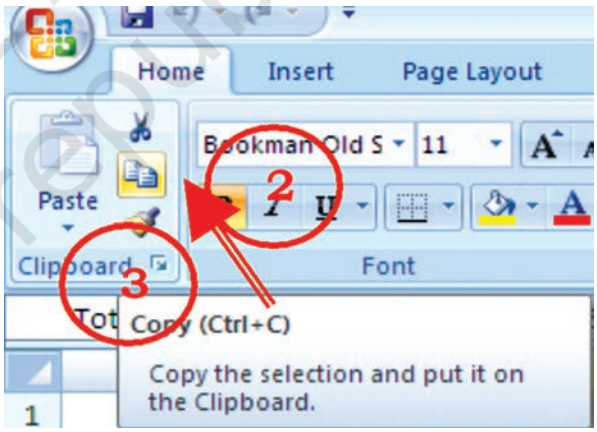

Figure 2.11(c)

Figure 2.11(d)

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logical_test : the value or expression that is determined to be true or false; this requires the usage of a logical operator. A logical operator is one used to perform a comparison between two values and produce a result of true or false (there is no middle result: something is not half true or half false or "Don't Know"; either it is true or it is false). For example, A1 < 20 could be used as a logical test, where symbol "<" is a logical operator "less than". (There are many more logical operators such as =, <=, <>, >, >= etc.)

value_if_true : The value returned if the test is determined to be true. This value can be a value, text, or expression, formula, etc. or it can be return the value of another cell.

value_if_false : The value returned, if the test is determined to be false. This value can be a value, text, or expression, formula, etc. or it can return the value of another cell.

e.g. i. = IF(A1 < 20, "Yes", "No") this function will return Yes if cell A1 < 20 and o for anything else.

ii. = IF (C2 > B2, (C2+D2)/2, (B2+D2)/2) this function will compare both cell C2 > B2 and will calculate and return (C2+D2)/2 if it is true else it will calculate and return (B2+D2)/2.

Example : Let us calculate the amount of saving (Cell address "value") on the basis of percentage value (Cell address "saving") shown in figure 2.12(a)

Creating IF function using the Formula Tab and dialogue box.

1. Select the cell F4 (Figure 2.12(a) where the function is to be introduce
2. Click at the Formula tab on the ribbon and click logical option.

IF =IF(E4 >10000,10%,5%)

	A	B	C	D	E	F	G
1	Saving Percentage and Amount						
2							
3	Sr. No.	Name	Income	Expense	Total	Saving	Value
4	1	Ramesh	12345.00	3456.00	8889.00	%)	444.45
5	2	Suzy	23456.00	4567.00	18889.00	10.00%	1888.90
6	3	Ashok	12340.00	5678.00	6662.00	5.00%	333.10
7	4	Mitesh	23450.00	12345.00	11105.00	10.00%	1110.50
8	5	Bhadrakant	17000.00	5678.00	11322.00	10.00%	1132.20
9	6	Khyati	9876.00	2345.00	7531.00	5.00%	376.55
10	7	Nirav	13467.00	4567.00	8900.00	5.00%	445.00
11	8	Priyanka	11111.00	5678.00	5433.00	5.00%	271.65

Figure 2.12(a)

3. Select **IF function** which will provide Function Arguments dialogue box (Figure 2.12(b).
4. Type an appropriate condition in the **logical_test** box (e.g. E4 > 10000)
5. In the **value_if_true** box type the require value (e.g. 10%) if the logical test condition is met.
6. In the **value_if_false** box type the value (e.g. 5%) if the logical test condition is NOT met.
7. Click OK, the answer for the condition will be displayed (in cell F4 it will be 5%). Copy the function from F4 to all other cells F5:F11.

In the Formula Box the function will be displayed as

=IF (F4>10000, 10%, 5%)

This is simple use of IF function. The nested IFs can be used to look for several conditions and to look at different types of functions.

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e.g. **= IF (AVERAGE (A2:A6) > 10, SUM (B2:B6), 0)**

This function will be able to look at the average of cells A2 to A6 and if the average is higher than 10 it will sum the value of the cells B2 to B6, if the average is equal to or less than 10 it will return to 0.

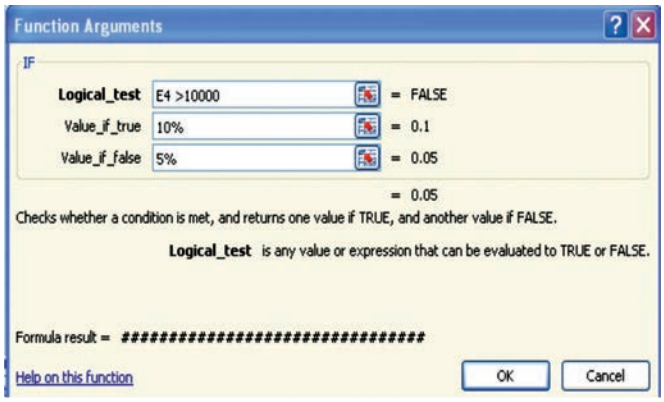

Figure 2.12(b)

In some cases, we need to check more than one condition. In other words, check the first condition; if that condition is false, check another condition. If a nested function is used as an argument it must return the same type of value that the argument uses. For example, if the argument returns a **TRUE** or **FALSE** value, then the nested function must return a **TRUE** or **FALSE** otherwise MS Excel will display an error message **#Value!** in the cell.

This way we can check as many conditions as we need to. The truthfulness of each condition would lead to its own statement. If none of the conditions is true, then it executes the last statement. To implement this scenario include an **IF()** function inside of another. Such as :

= IF (logical_test, value_if_true, value_if_false) simple if statement.

Let us substitute other IFs

IF (logical_test, IF (logical_test, IF (logical_test, value_if_true, value_if_false), value_if_false), value_if_false)

e.g. Suppose E2 cell contains marks of a test and cell F2 will have result based on following nested IF () condition.

= IF (E2<96, IF (E2<91, IF (E2<55,"Fail","C Grade"), "B Grade"), "A Grade")

2.1.4 Other useful Functions

In business applications the input of data usually contains dates (date of invoice preparation, date of payment, payment received date, or due date etc.), rate of interest, tax percentage and output information may require age calculation, duration, delays in payment, accumulated interest, depreciation, future value, net present value, etc.

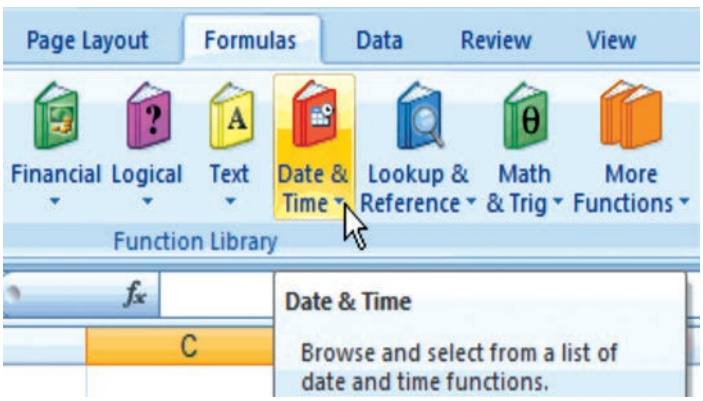

Figure 2.13

The MS Excel provides library of such functions in which input data

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can be worked as arguments and result available from the function will be output information. On the ribbon of MS Excel, the formula tab contains categorised function libraries (Figure 2.13).

a. Date and Time Function.
b. Mathematical Function.
c. Text Manipulation function.
d. Logical Function (other than IF).
e. Lookup and Reference Function.
f. Financial Function.

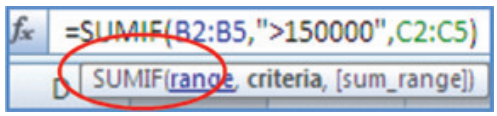

Figure 2.14

The complete details of each function from a range of above categories including examples are available through **Help (?)** on the Ribbon. The quickest way to get help on a function whose name (e.g. SUMIF) when we entered on formula bar followed by equal to sign then double-click the function's name that appears in the strip (as shown in the figure 2.14). We will learn some of the useful function with the help of examples.

2.1.4.1 Date and Time Function

1. TODAY () is the function for today's date in the blank worksheet.

TODAY – Returns the serial number of the current date. The serial number is the **date-time** code used by Excel for date and time calculations. Times are represented as fractions of a day. By default January 1, 1900 is serial number 1. Thus, January 1, 2009 is serial number 39814 (because it is 39814 days after January 1, 1900).

2. NOW () is similar function but it includes the current time also (Figure 2.15).

3. DAY(serial_number) function returns the day of a date as an integer ranging from1 to 31. For example, if A5 = 16-Apr-2009 then = DAY (A2) will be 16. Similarly, two other functions **MONTH(serial_number)** returns month of a date as an integer ranging from 1 (January) to 12 (December) (Figure 2.16) and **YEAR(serial_number)** returns the year corresponding to a date as an integer ranging from 1900 – 9999.

4. DATEVALUE (date_text) converts a date in the form of text to a serial number e.g. =DATEVALUE("16-04-2009") will return a value 39919.

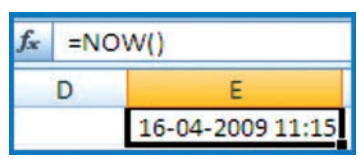

Figure 2.15

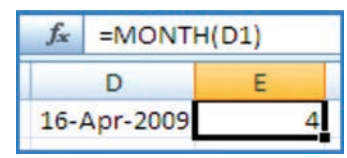

Figure 2.16

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Example: To find out the age of an employee as on today is a very simple mathematical calculation in the spreadsheet, e.g. the age of a person on 16-Apr-2009 whose Date of Birth is 16-Apr-1980 can be calculated as per Figure 2.17. The difference of two dates (in D3) is divided by 365.25 to convert days into years (considered the fractional value for leap years).

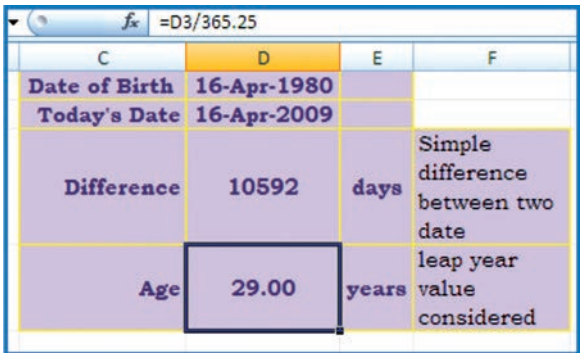

Figure 2.17

2.1.4.2 Mathematical Function

In business applications some of the Mathematical Functions are very useful, such as:

1. SUMIF is the function which adds the cells as per given specified criteria the syntax of this is as follows:

SUMIF (**range**, **criteria**, sum_range) where

Range it is the range of cells to evaluate.

Criteria it is the criteria in the form of a number, expression, or text that defines which cells will be added, e.g. criteria can be expressed 1500, "1500", ">1500" or "Books".

Sum_range are the actual cells to sum.

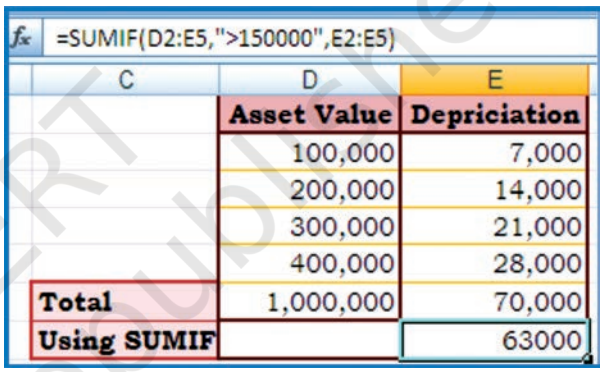

Figure 2.18

e.g. There are sum Asset Values (D2:D5) and related to each asset values there are deprecation values (E2:E5). Using SUMIF function we have to calculate the sum of depreciation for those Asset Values which are more than 1, 70,000/-.

The function is written in the cell E7 like =SUMIF (D2:E5,">150000, E2:E5) which gives result 63,000/- (Figure 2.18)

2. ROUND is the function to rounds a number to specified number of digits. The syntax of this function is as follows:

ROUND (**number**, num_digits) where

Number Is the number to round (preferably fractional number)

Num_digits specifies the number of digits to round the **Number**. There may be some different situations for **Num_digits** as follows:

a. If Num_digits is greater than 0 (zero), then number is rounded to the specified number of decimal places.

b. If Num_digits is 0, then number is rounded to the nearest integer.

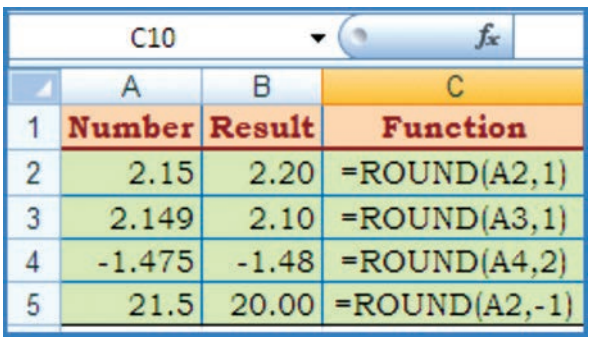

Figure 2.19

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c. If Num_digits is less than 0, then number is rounded to the left of the decimal point.

Example - refer Figure 2.19

i. to round the number 21.5 by 1 digit (result is 2.2)

ii. to round the number 2.149 by 1 digit (result is 2.1)

iii. to round the number -1.475 by 2 digits (result is -1.48)

vi. to round the number 21.5 by -1 digit (result is 20.0)

To round a number to the nearest whole number because decimal values are not significant or round a number to multiples of 10 to simplify an approximation of amounts. There are several ways to round a number other than ROUND are:

ROUNDUP (**number**, **num_digits**) which rounds a number up, away from 0 (zero) e.g.

= ROUNDUP (3.2, 0)	Rounds 3.2 up to zero decimal places and the value is 4.
= ROUNDUP (76.9, 0)	Rounds 76.9 up to zero decimal places and value is 77.
= ROUNDUP (3.14159, 3)	Rounds 3.14159 up to three decimal places; value 3.142.
= ROUNDUP (-3.14159, 1)	Rounds -3.14159 up to one decimal place; value -3.2.
= ROUNDUP (31415.92654,-2)	Rounds 31415.92654 up to 2 decimal places to the left of the decimal; value 31500.

ROUNDDOWN (number, num_digits) which rounds a number down, toward zero.

= ROUNDDOWN (3.2, 0)	Rounds 3.2 down to zero decimal places; value 3.
= ROUNDDOWN (76.9, 0)	Rounds 76.9 down to zero decimal places; value 76.
= ROUNDDOWN (3.14159, 3)	Rounds 3.14159 down to three decimal places; value 3.141.
= ROUNDDOWN (-3.14159, 1)	Rounds -3.14159 down to one decimal place; value -3.1.
= ROUNDDOWN (31415.92654, -2)	Rounds 31415.92654 down to 2 decimal places to the left of the decimal; value 31400.

3. COUNT

This function counts the number of cells that contain numbers and counts numbers within the list of arguments. COUNT is use to get the number of the entries in a number field (including date also) i.e. in a range or array of numbers.

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In Excel other than counting function COUNT; other functions are **COUNTA**, **COUNTBLANK**, and **COUNTIF** — which enable us to count the number of cells that contain values, are nonblank (and thus contain entries of any kind), or count only the cells in a given range that meet the user defined criteria.

The syntax for COUNT is **COUNT** (value1, value2.....,) where value1, value2, ... are 1 to 255 arguments that can be a variety of different types of data(logical values represented in numbers, numbers, dates, or text representation of numbers), but only numbers are counted.

	A	B	C
1	**For Count Function Data**		
2	**Data**	**Number**	
3	Sales	32	
4	12-08-2008	54	
5		75	
6	19	86	
7	22.24		
8	TRUE		
9	#DIV/0!		
10			
11	**Details for Cell A1;B9**	**Value**	**Function Used**
12	Total Cells	18	=ROWS(Count_Data)*COLUMNS(Count_Data)
13	Occupied Cells	13	=COUNTA(Count_Data)
14	Numeric Enteris Cells	7	=COUNT(Count_Data)
15	Blank Cells	5	=COUNTBLANK(Count_Data)

Figure 2.20

Arguments that are error values or text that cannot be translated into numbers are ignored.

If an argument is an array or reference, only numbers in that array or reference are counted. Empty cells, logical values, text, or error values in the array or reference are ignored.

COUNTA function will be count logical values, text, or error values. The Figure 2.20 contains a named range for cells A1:B9 as Count_Data

There are other functions also such as **ROWS** and **COLUMNS** are used. The syntax is as follows:

ROWS (**array**)

The function returns the number of rows in a reference or array; where an **Array** is an array, an array formula or a reference to a range of cells for which we want the number of rows.

COLUMNS (**array**)

This function returns the number of columns in an array or named range reference; where an **Array** is an array or array formula or a reference to a range of cells for which we want the number of columns.

***Array**: Used to build single formulas that produce multiple results or that operate on a group of arguments that are arranged in rows and columns. An array range shares a common formula; an array constant is a group of constants used as an argument.*

Array formula**: A formula that performs multiple calculations on one or more sets of values, and then returns either a single result or multiple results. Array formulas are enclosed between braces { } and are entered by pressing **CTRL+SHIFT+ENTER.

COUNTIF (**range, criteria**) (Figure 2.21)

This function counts the number of cells within a range that meet the given criteria; in this function the **Range** is one or more cells to count, including numbers or names, arrays, or references that contain numbers. The blank cells and text values are ignored. (e.g. A2:B5)

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	A	B
1	**Fruit**	**Quantity**
2	apples	32
3	oranges	54
4	peaches	75
5	apples	86
6	**Result**	**Description (result) and Function Used**
7	1	Number of cells with apples in the first column above (2) =COUNTIF(A2:A4,"apples")
8	1	Number of cells with peaches in the first column above (1) =COUNTIF(A2:A4,A3)
9	1	Number of cells with oranges and apples in the first column above (3) =COUNTIF(A2:A4,A2)+COUNTIF(A2:A4,#REF!)
10	1	Number of cells with a value greater than 55 in the second column above (2) =COUNTIF(B2:B4,">55")
11	2	Number of cells with a value not equal to 75 in the second column above (3) =COUNTIF(B2:B4,"<>"&B3)
12	3	Number of cells with a value greater than or equal to 32 and less than or equal to 85 in the second column above (3) =COUNTIF(B2:B4,">=32")-COUNTIF(B2:B4,">85")

Figure 2.21

Criteria are the form of a number, expression, cell reference, or text that defines which cells will be counted. For example, criteria can be expressed as 32, "32", ">32", "apples", or B4.

2.1.4.3 Text Manipulation Function

1. TEXT

This function converts a numeric value to text in a specific number format; and the syntax is :

TEXT (**value**, **format_text**) where,

Value is a numeric value, a formula that evaluates to a numeric value, or a reference to a cell containing a numeric value.

Format_text is a numeric format as a text string enclosed in quotation marks. We can see various numeric formats by clicking the **Number**, **Date**, **Time**, **Currency**, or **Custom** in the **Category** box of the **Number** tab in the **Format Cells** dialog box, and then viewing the formats displayed.

This function is useful in situations where we want to display numbers in a more readable format, or want to combine numbers with text or symbols. For example, suppose cell L1 contains the number **23.5**. Suppose we want to format this number by adding with "Rs." and convert into amount using this function:

=TEXT L1,"Rs. 0.00") which will be displayed as Rs**. 23.50** (Figure 2.22).

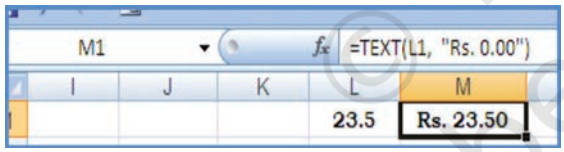

Figure 2.22

We can also format numbers by using the commands in the **Number** group on the **Home** tab of the Ribbon. However, these commands work only if the entire cell is numeric. Refer Figure 2.22(a); you will find in cell A5(A6) using function combined with '$' sign which can be used with other functions (such as logical).

2. CONCATENATE

This function joins two or more text strings into one text string and its syntax is :

	A	B
1	**Salesperson**	**Sales**
2	Shashiknat	2800
3	Anil Vaya	40%
4	**Result using Text function**	**Formula Used in the cell**
5	Shashiknat sold Rs. 2800.00 worth of units.	=A2&" sold "&TEXT(B2, "Rs. 0.00")&" worth of units."
6	Anil Vaya sold 40% of the total sales.	=A3&" sold "&TEXT(B3,"0%")&" of the total sales."

Figure 2.22(a)

CONCATENATE (**text1**, **text2**,...) where

text1, text2, ... are 2 to 255 text items to be joined into a single text item. The text items can be text strings, numbers, or single-cell references.

Example combining First Name,

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Middle Name and Surname of the employees into Full Name using CONCATENATE Function (Figure 2.22(b).

2.1.4.4 Logical Function

We have learned earlier about IF functions in this chapter. Let us understand two more other logical functions which are very useful. When a situation arises to compare more than one condition and the result of joint conditions is used for further operations.

E2 =CONCATENATE(B2," ",C2," ", D2)

	A	B	C	D	E
1	EC No.	First Name	Middle Name	Last Name	Full Name
2	1234	Anil	Kumar	Vaya	Anil Kumar Vaya
3	2345	Kanu	U	Patel	Kanu U Patel
4	3456	Mitesh	Sanmukhlal	Sharma	Mitesh Sanmukhlal Sharma

Figure 2.22(b)

*A **logical value** (true or false) outcome is the comparison of data values or results of arithmetic expressions compared with another data values or results of another arithmetical expressions using logical operator.*

1. AND function gives only a **TRUE** or **FALSE** answer.

To determine whether the output will be TRUE or FALSE, the AND function evaluates at least one mathematical expression located in another cell in the spreadsheet. The syntax for the AND function is:

= AND (logical-1, logical-2, ... logical-255)

where **logical-1 , logical-2 , ...** - refers to the cell reference that is being checked. Up to 255 logical values can be entered into the function. Returns **TRUE** if all its arguments evaluate to **TRUE**; returns **FALSE** if one or more arguments evaluate to **FALSE.**

Example

1. In the following example the outcome of two logical values is given in Result

Formula	Description	Result
a.= AND (TRUE, TRUE)	all arguments are TRUE	TRUE
b.= AND (TRUE, FALSE)	One argument is FALSE	FALSE
c.= AND (2+2=4, 2+3=5)	all arguments evaluate to TRUE	TRUE

2. In these example there are two cell values cell A2 contains 50 and cell A3 contain 104 then :

Formula	Description	Result
a. =AND (A2>1, A2<100)	Displays TRUE if the number in cell A2 is between 1 and 100. Otherwise, it displays FALSE.	TRUE
b. =IF(AND(A3>1, A3<100), A3,"The value is out of	Displays the number in cell if it is between 1 and 100. Otherwise, it displays the message	"The value is out of range.
c. =IF(AND(A2>1, A2<100), A2, "The value is out of range.")	Displays the number in cell A2, if it is between 1 and 100. Otherwise, it displays a message.	50

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One common use for the **AND** function is to expand the usefulness of other functions that perform logical tests.

In the above example, the **IF** function performs a logical test and then returns one value if the test evaluates to **TRUE** and another value if the test evaluates to FALSE. By using the **AND** function as the ***logical_test*** argument of the **IF** function, we can test many different conditions.

2. OR function is like other logical functions, the OR function gives only a **TRUE** or **FALSE** answer. To determine whether the output will be **TRUE** or **FALSE**, the OR functions evaluates at least one mathematical expression located in another cell in the spreadsheet. This function returns TRUE if any argument is **TRUE**; returns **FALSE** if all arguments are **FALSE**.

The syntax for the OR function is:

= OR (logical-1, logical-2, ... logical-255)

Logical-1, logical-2 ... - refers to the cell references that are being checked. Up to 255 logical values can be entered into the function.

Example

Formula	Description	Result
a.= **OR** (TRUE, FALSE)	One argument is TRUE	**TRUE**
b.=**OR** ((1+1)=1,(2+2)=5)	All arguments evaluate to FALSE	**FALSE**
c.=**OR** (TRUE,FALSE,TRUE)	At least one argument is TRUE	**TRUE**

2.1.4.5 Lookup and References Function

The **LOOKUP** function returns a value either from a one-row or one-column range or from an array. The **LOOKUP** function has two syntax forms: **vector** and **array**.

The Look Up function can be used as an alternative to the IF function for elaborate tests or tests that exceeds the limit for nesting of IF functions.

*The **vector form** of **LOOKUP** looks in a one-row or one-column range (known as a vector) for a value, and then returns a value from the same position in a second one-row or one-column range.*

*The **array form** of **LOOKUP** looks in the first row or column of an array for the specified value, and then returns a value from the same position in the last row or column of the array.*

1. LOOKUP (Vector Form)

The syntax is **LOOKUP (*lookup_value, lookup_vector, result_vector*)**

- *Lookup_value* is a value that **LOOKUP** searches for in the first vector. *Lookup_value* can be a number, text, a logical value, or a name or reference that refers to a value.

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- *Lookup_vector* is a range that contains only one row or one column. The values in *lookup_vector* can be text, numbers, or logical values.

It is important to know that the values in *lookup_vector* must be placed in ascending order. For example, -2, -1, 0, 1, 2 or A-Z or FALSE, TRUE else **LOOKUP** may not give the correct value.

- *Result_vector* is a range that contains only one row or column. It must be the same size as *lookup_vector*.
- If **LOOKUP** cannot find the *lookup_value*, it matches the largest value in *lookup_vector* that is less than or equal to *lookup_value*.
- If *lookup_value* is smaller than the smallest value in *lookup_vector*, **LOOKUP** gives the #N/A error value.

	A	B
1	**Frequency**	**Colour**
2	4.14	red
3	4.19	orange
4	5.17	yellow
5	5.77	green
6	6.39	blue

Figure 2.23

Example (Figure 2.23)

Column (A) and Column (B) dipicts the frequency and name of Colour respectively. The results of the use of LOOKUP function.

Function	**Description (Result)**
=LOOKUP (4.19, A2:A6, B2:B6)	Looks up 4.19 in column (A), and returns the value from column (B) that is in the same row (orange).
=LOOKUP (5.00, A2:A6, B2:B6)	Looks up 5.00 in column (A), and returns the value from column (B) that is in the same row (orange).
=LOOKUP (7.66, A2:A6, B2:B6)	Looks up 7.66 in column (A), matches the next smallest value (6.39), and returns the value from column (B) that is in the same row (blue).
=LOOKUP (0, A2:A6, B2:B6)	Looks up 0 in column (A), and returns an error because 0 is less than the smallest value in the lookup vector A2:A7 (#N/A).

2. *LOOKUP (Array Form)*

The syntax is **LOOKUP (*lookup_value, array*)**

- *Lookup_value* is a value that **LOOKUP** searches for in an array. *Lookup_value* can be a number, text, a logical value, or a name or reference that refers to a value.
  - If **LOOKUP** cannot find the *lookup_value*, it uses the largest value in the array that is less than or equal to *lookup_value*.
  - If *lookup_value* is smaller than the smallest value in the first row or column (depending on the array dimensions), **LOOKUP** returns the #N/A error value.

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- *Array* is a range of cells that contains text, numbers, or logical values that we want to compare with *lookup_value*.
  - If *array* covers an area that is wider than it is tall (more columns than rows), **LOOKUP** searches for *lookup_value* in the first row.
  - If *array* is square or is taller than it is the wide (more rows than columns), **LOOKUP** searches in the first column.

	A	B
1	a	10
2	b	20
3	c	30
4	d	40

Figure 2.23(a)

Example *(Figure 2.23(a))*

Column (A) contains a, b, c, d some text values and Column (B) contain 10, 20, 30, and 40 some numbers. The Array is A1:B4.

The LOOKUP function used for different alpha character as follows:

Function	**Description (Result)**
=LOOKUP ("c", A1:B4)	Looks up "C" in first row of the array and returns the value in the last row that is in the same column (30).
=LOOKUP ("b", A1:B4)	Looks up "b" in first row of the array and returns the value in the last column that is in the same row (20).

3. VLOOKUP

The **VLOOKUP** function, which stands for vertical lookup, helps us to find specific information in large data tables such as an inventory list of parts or a large employee contact list. The **VLOOKUP** function searches and matches first the required value from the column of a range of cells, and then returns a value from any cell on the same row of the range. The syntax is

VLOOKUP (**lookup_value**, **table_array**, **col_index_num**, range_lookup) where

Lookup_value - The value to search in the first column of the table. Lookup_value can be a value or a reference. If lookup_value is smaller than the smallest value in the first column of table_array, **VLOOKUP** returns the #N/A error value.

Table_array - Two or more columns of data. Use a reference to a range or a range name. The values in the first column of table_array are the values searched by lookup_value. These values can be text, numbers, or logical values. Uppercase and lowercase texts are equivalent.

Col_index_num – The column number in table_array from which the matching value must be returned. A col_index_num of 1 returns the value in the first column in table_array; a col_index_num of 2 returns

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the value in the second column in table_array, and so on. If col_index_num is:

- Less than 1, VLOOKUP returns the #VALUE! error value.
- Greater than the number of columns in table_array, VLOOKUP returns the #REF! Error value.

Range_lookup – A logical value that specifies whether we want VLOOKUP to find an exact match or an approximate match:

- If TRUE or omitted, an exact or approximate match is returned. If an exact match is not found, the next largest value that is less than lookup_value is returned. The values in the first column of table_array must be placed in ascending sort order; otherwise, VLOOKUP may not give the correct value.
- If FALSE, VLOOKUP will only find an exact match. In this case, the values in the first column of table_array do not need to be sorted. If there are two or more values in the first column of table_array that match the lookup_value, the first value found is used. If an exact match is not found, the error value #N/A is returned.

In the following examples we will explain the steps how the VLOOKUP function to find the specific information from the spreadsheet table.

D18

	A	B	C	D
1	**Employee Code**	**First Name**	**Last Name**	**Basic Pay**
2	1873	Prakash	Sharma	5,176.00
3	3456	Shashikant	Thakur	3,453.00
4	4537	Ajit	Mathur	3,355.00
5	5678	Vinod	Upadhyay	428.00
6	16782	Kanu	Patel	3,457.00
7	34567	Anil	Vaya	5,467.00
8				

Figure 2.24

Example -1 (Refer Figure 2.24) to find out employee's Basic Pay

=VLOOKUP (A3, A1:D7, 4, FALSE)

Lookup the Basic Pay for Employee Code **3456** (A3) in the first column and return the matching value in the same row of the fourth column i.e. **3453.00**(d3).

	A	B	C	D
1	**Item-ID**	**Item**	**Cost**	**Markup**
2	AS-469	Aspirator	Rs.2.56	45%
3	BI-567	Bib	Rs.3.56	40%
4	DI-328	Diapers	Rs.21.45	35%
5	ST-340	Stroller	Rs.145.67	30%
6	WI-989	Wipes	Rs.5.12	40%

Figure 2.25

Example - 2 (Refer Figure 2.25)

In this example we search the column **Item-ID** of baby products from the table A2 :D6 and match the values in the Cost (column number 3) and Markup (column number 4) columns to calculate prices and with different test conditions. The final result of the function is also given after description.

Function	**Description**
= VLOOKUP ("DI-328", A2:D6, 3, FALSE) * (1 + VLOOKUP ("DI-328", A2:D6, 4, FALSE)).	Calculates the retail price of diapers by adding the markup percentage to the cost. **Result** Rs. 28.96

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= (VLOOKUP ("WI-989", A2:D6, 3, FALSE) * (1 + VLOOKUP ("WI-989", A2:D6, FALSE))) * (1 - 20%).	Calculates the sale price of wipes by subtracting a specified discount 4, from the retail price **Result** .Rs. 5.73
= IF(VLOOKUP(A2, A2:D6, 3, FALSE) >= 20, "Markup is" and 100 * VLOOKUP (A2, A2:D6, 4, FALSE) and "%", "Cost is under Rs.20.00").	If the cost of an item is greater than or equal to Rs. 20.00, displays the string "Markup is *nn*%"; otherwise, displays the string "Cost is under Rs. 20.00". **Result**: Markup is 30%
= IF (VLOOKUP (A3, A2:D6, 3, FALSE) >= 20, "Markup is:" and 100 * VLOOKUP (A3, A2:D6, 4, FALSE) and"%", "Cost is Rs." and VLOOKUP (A3, A2:D6, 3, FALSE))	If the cost of an item is greater than or equal toRs.20.00, displays the string Markup is *nn*%"; otherwise, displays the string "Cost is Rs.*n.nn*". **Result**: Cost is Rs. 3.56

4. HLOOKUP

The HLOOKUP function (short name of **H**orizontal **Lookup**), searches for a value in the first row of a table array and returns the corresponding value in the same column from another row of the same table array. The syntax for HLOOKUP is as follows:

HLOOKUP(lookup_value, table_array, row_index_num, range_lookup) where

- **Lookup_value** – The value to search for in the first row of the table array.
- **Table_array** – Two or more rows of data. The values in the first row of the table_array are the values searched for the lookup_value. These values can be text, numbers, or logical values. Uppercase and lowercase texts are equivalent.
- **Row_index_num** – The row number in table_array from which the corresponding value must be returned. A row_index_num of 2 returns the value in the second column in table_array; a row_index_num of 3 returns the value in the third column in table_array, and so on.
- **Range_lookup** – A logical value that specifies whether we want HLOOKUP to find an exact match or an approximate match. If set to "FALSE", a corresponding value will be returned only if an exact match is found. If set to "TRUE", the nearest match will be considered if an exact one is not found.

Let us take a simple example to understand the HLOOKUP function: In the following two different worksheets:

Example *(Figure 2.26 and 2.27)*

Worksheet 1 - The values for **Budget** are in Row **2** corresponding to each **Quarter** in Row **1.**

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Worksheet 2 - Corresponding to each Quarter (column (C)); some part of budget is Spent (column (E)) – which is listed vertically. We want to pick the budget for each quarter from the **Worksheet 1** and put it in column **(D)** of **Worksheet 2** and then calculate the amount **Pending** (column **(F)**) correspondingly. In cell D2:D5 we will enter the HLOOKUP function as follows: (as shown for D4 cell) = HLOOKUP (C4; Budget! $A$1:$E$2; 2; FALSE) where in this function.

	A	B	C	D	E
1	Quarter	Q1	Q2	Q3	Q4
2	Budget	35000	30000	32000	40000

=HLOOKUP(C4,budget!$A$1:$E$2,2,FALSE)

B	C	D	E	F	G
	Quarter	Budget	Spent	Pendig	
	Q1	35000	35000	0	
	Q2	30000	21000	9000	
	=HLOOKUP(C4,budget!$A$1:$E$2,2,FALSE)				
	Q4	40000	0	40000	

Figures 2.26 and 2.27

C4	lookup value, for the quarter
budget!$B$1:$E$2	Table array, found in worksheet 1: named **budget**.
2	Row_index_num, is the row 2 in worksheet 1: named **Budget**
FALSE	We want to find an exact match
Pending	= D4-E4 Copy both the functions from D4 to the Cells D2, D3 and D5 and from F4 to Cells F2, F3 and F5 can be copied.

It is important to note that whenever any table array (or array) is referred in lookup functions the cell address referred (normally it is relative) must be converted in to absolute cell addresses.

2.1.2.6 Financial Functions

1. ACCRINT

This function returns the accrued interest for a security that pays periodic interest. The syntax of this is as follows:

ACCRINT (issue, first_interest, settlement, rate, par, frequency, basis, calc_method)

Dates should be entered by using the DATE function, or as results of other formulas or functions. For example, use DATE (2008, 5, 23) for the 23rd day of May, 2008. Problems can be occur if dates are entered as text.

Issue	is the security's issue date.
first_interest	is the security's first interest date.
Settlement	is the security's settlement date. The security settlement date is the date after the issue date when the security is traded to the buyer.
Rate	is the security's annual coupon rate.
Par	is the security's par value. By default Par is 1000

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Frequency is the number of coupon payments per year. For annual payments, frequency = 1; for Semi-annual, frequency = 2; for quarterly, frequency = 4.

Basis is the type of day count basis to use.

Excel stores dates as sequential serial numbers so they can be used in calculations. By default, January 1, 1900 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900; in Excel for the **ACCRINT** is calculated as follows:

$$ACCRINT = par \times \frac{rate}{frequency} \times \sum_{\lambda 1}^{NC} \frac{A^{1}}{NL_{i}}$$

2. CUMIPMT

This function returns the cumulative interest paid between two periods (Refer Figure 2.28). The syntax of the function is:

CUMIPMT (**rate**, **nper**, **pv**, **start_period**, **end_period**, **type**)

	A	B	C
1	**Data**	**Description**	
2	9%	Annual interest rate	
3	30	Years of the loan	
4	125,000	Present value	
5	**Result**	**Description**	**Formula**
6	-11135.23	Total interest paid in the second year of payments, periods 13 through 24	=CUMIPMT(A2/12,A3*12,A4,13,24,0)
7	-937.5	Interest paid in a single payment in the first month	=CUMIPMT(A2/12,A3*12,A4,1,1,0)

Figure 2.28

Rate is the interest rate.

Nper is the total number of payment periods.

Pv is the present value.

Start_period is the first period in the calculation. Payment periods are numbered beginning with 1.

End_period is the last period in the calculation.

Type is the timing of the payment (which may be either 0 or 1)

0 (zero) means Payment at the end of the period

1 means Payment at the beginning of the period.

3. PV

	A	B	C
1	**Function Parameters**	**Input Values**	**Description**
2	pmt	500	Money paid out of the annuity at the end of every month
3	rate	8%	Interest rate earned on the money paid out (to be calculated per month)
4	nper	20	Years the money will be paid out (total number of instalments monthly)
5	type	0	money paid at the end of month
6	**Function**		**=PV(rate,nper,pmt,[fv],type)**
7	**(Rs.59,777.15)**		**=PV(B3/12,B4*12,500,,0)**

Figure 2.29

This function returns the present value of an investment. The present value is the total amount that a series of future payments is worth now. For example, when we borrow money, the loan amount is the present value (Figure 2.29). The syntax of the function is :

PV (**rate**, **nper**, **pmt, fv**, type) where

Rate is the interest rate per period. For example, for an automobile loan at a

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10% annual interest rate and installments are made the monthly payments, then the interest rate per month is 10%/12, or 0.83%. The value for rate into the function will be 10%/12, or 0.83%, or 0.0083.

Nper is the total number of payment periods in an annuity. For example, if this loan is a four-year car loan and makes monthly payments, then loan has 4*12 (or 48) periods. The value for nper will be 48.

Pmt is the payment made each period and cannot be change over the life of the annuity. Typically, *pmt* includes principal and interest but no other fees or taxes. For example, the monthly payments on an Rs.10, 000, for four-year car loan at 12 per cent are Rs. 263.33. We have to enter -263.33 into the function as the pmt. If *pmt* is omitted, then *fv* must be included in the argument.

Fv is the future value, or a cash balance to attain after the last payment is made. If *fv* is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0). For example, if we want to save Rs. 50,000 to pay for a special project in 18 years, then Rs. 50,000 is the future value. Then it is necessary to guess an interest rate and determine how much to save each month. If fv is omitted, then *pmt* must be included as the argument.

Type is the number 0 or 1 and indicates when payments are due. The *fv* and *type* arguments are optional. The *fv* argument is the future value or cash balance that we want to have after making last payment. If we omit the *fv* argument, Excel assumes a future value of zero. The *type* argument indicates whether the payment is made at the beginning or end of the period: (0 or omit the *type* argument when the payment is made at the end of the period and use 1 when it is made at the beginning of the period).

When using financial functions, keep in mind that the *fv*, *pv*, and *pmt* arguments can be positive or negative, depending on whether we are receiving the money or paying out the money. It may be noted that if we want to express the *rate* argument in the same units as the *nper* argument, so that if we make monthly payments on a loan and we express the *nper* as the total number of monthly payments, as in 360 (30×12) for a 30-year mortgage, we need to express the annual interest rate in monthly terms as well. Excel solves for one financial argument in terms of the others. If rate is not 0, then:

$$pv * (1+rate)^{nper} + pmt(1+rate * type) * \left(\frac{(1+rate)^{nper} - 1}{rate}\right) + fv = C$$

If rate is 0, then:

(pmt * nper) + pv + fv = 0

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*An **annuity** is a series of constant cash payments made over a continuous period. For example, a car loan or a mortgage is an annuity.*

4. FV

This function returns the future value of an investment based on periodic, constant payment and a constant interest rate (Figure 2.30). The syntax of the function is :

FV (**rate**, **nper**, **pmt**, pv, type) where

Rate is the interest rate per period.

Nper is the total number of payment periods in an annuity.

Pmt is the payment made each period; it cannot change over the life of the annuity. Typically, *pmt* contains principal and interest but no other fees or taxes. If pmt is omitted, then include the pv value in the argument.

Pv is the present value, or the lump-sum amount that a series of future payments is worth right now. If pv is omitted, it is assumed to be 0 (zero), and then include the *pmt* value in the argument.

Type is the number 0 or 1 and indicates when payments are due. If type is omitted, it is assumed to be 0.

Example

	A	B	C
1	**Name Of Parameter**	**Data**	**Description**
2	rate	6%	Annual interest rate
3	nper	10	Number of payments
4	pmt	-200	Amount of the payment
5	pv	-500	Present value
6	type	1	Payment is due at the beginning of the period
7	**Result**		**Function**
8	Rs.2,581.40		Future value of an investment with the above terms
9			=FV(B2/12, B3, B4, B5, B6)

	A	B	C
1	**Name Of Parameter**	**Data**	**Description**
2	rate	6%	Annual interest rate
3	nper	10	Number of payments
4	pmt	-200	Amount of the payment
5	pv	-500	Present value
6	type	0	Payment is due at the end of the period
7	**Result**		**Function**
8	Rs.2,571.18		Future value of an investment with the above terms
9			=FV(B2/12, B3, B4, B5, B6)

Figure 2.30

In the function **FV** (**rate**, **nper**, **pmt**, pv, type); the values are substituted as given in different cells of the worksheets and the result cell A8 is having Rs. 2581.40 first worksheet for type is 1 while in second worksheet shows the value of result Rs. 2571.18 for type is 0.

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5. PMT

The **PMT** function calculates the periodic payment for an annuity, assuming equal payments and a constant rate of interest (Figure 2.26(d)). The syntax of PMT function is as follows:

= **PMT**(**rate**, **nper**, **pv**, [fv], [type]) where

rate is the interest rate per period,

nper is the number of periods,

pv is the present value or the amount the future payments are worth presently,

fv is the future value or cash balance that after the last payment is made (a future value of zero when we omit this optional argument)

type is the value 0 for payments made at the end of the period or the value 1 for payments made at the beginning of the period.

The PMT function is often used to calculate the payment for mortgage loans that have a fixed rate of interest.

Example (Figure 2.31)

In the sample worksheet that contains a table using the PMT function to calculate loan payments for interest rate 8% per annum and principal amount Rs. 1000/-

Here we have used both values of type = 0 and 1

	A	B	C
1	**Parameters**	**Data**	**Description**
2	rate	8%	Annual interest rate
3	nper	10	Number of months of payments
4	pv	10000	Amount of loan
5	**Formula**	**Result**	**Description**
6	=PMT(B2/12, B3, B4)	(Rs.1,037.03)	Monthly payment for a loan with the above terms
7	=PMT(B2/12, B3, B4, 0, 1)	(Rs.1,030.16)	Monthly payment for a loan with the above terms, except payments are due at the beginning of the period

Figure 2.31

6. RATE

This function returns the interest rate per period of an annuity. RATE is calculated by iteration and can have zero or more solutions. If the successive results of RATE do not converge to within 0.0000001 after 20 iterations, RATE returns the #NUM! error value (2.32). The syntax of the function is as follows:

RATE (**nper**, **pmt**, **pv**, fv, type, guess) where.

Nper is the total number of payment periods in an annuity.

Pmt is the payment made each period and cannot change over the life of the annuity. Typically, *pmt* includes principal and interest but no other fees or taxes. If pmt is omitted, then include the *fv* as argument.

	A	B	C
1	**Parameters**	**Data**	**Description**
2	nper	4	Years of the loan
3	pmt	-200	Monthly payment
4	pv	8000	Amount of the loan
5	**Function**	**Result**	**Description**
6	=RATE(B2*12, B3, B4)	1%	Monthly rate of the loan with the above terms
7	=RATE(B2*12, B3, B4)*12	0.09242	Annual rate of the loan with the above terms

Figure 2.32

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Pv is the present value — the total amount that a series of future payments is worth now.

Fv is the future value, or a cash balance attain after the last payment is made.

If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0).

Type is the number 0 or 1 and indicates when payments are due.

0 or omitted means payment is due at the end of the period 1 means payment is due at the beginning of the period.

Guess is the guess for what the rate will be. If omitted, it is assumed to be 10 per-cent.

7. NPV

This function calculates the net present value of an investment by using a discount rate and a series of future payments (negative values) and income (positive values). The syntax for the function is:

NPV (**rate**, **value1, value2**,....) where

Rate is the rate of discount over the length of one period.

Value1, value2, ... are 1 to 254 arguments representing the payments and income. Value1, value2, ... must be equally spaced in time and occur at the end of each period. *NPV* uses the order of value1, value2 ...., to interpret the order of cash flows. It is essential that entry for payment and income values are in the correct sequence.

The *NPV* investment begins one period before the date of the value1 cash flow and ends with the last cash flow in the list. The *NPV* calculation is based on future cash flows.

$$NPV = \sum_{i-1}^{n} \frac{values_i}{(1+rate)^i}$$

If n is the number of cash flows in the list of values, the formula for NPV is:

	A	B	C
1	**Parameters**	**Data**	**Description**
2	rate	10%	Annual discount rate
3	value1	-10,000	Initial cost of investment one year from
4	value2	3,000	Return from first year
5	value3	4,200	Return from second year
6	value4	6,800	Return from third year
7	**Function**	**Result**	**Description**
8	=NPV(B2, B3, B4, B5, B6)	Rs.1,188.44	Net present value of this investment
9			

Figure 2.33

NPV (Figure 2.33) is similar to the PV function (present value). The primary difference between PV and NPV is that PV allows cash flows to begin either at the end or at the beginning of the period. Unlike the variable NPV cash flow values, PV cash flows must be constant throughout the investment.

NPV is also related to the IRR function (internal rate of return). IRR is the rate for which NPV equals zero: NPV (IRR (...),) = 0.

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2.2 DATA ENTRY, TEXT MANAGEMENT AND CELL FORMATTING

In any computerised business application, the basic requirement is to input data; which may be either for processing parameters e.g. input of data parameters such as month number and name of the month or number of working days, DA%, etc. for the processing of payroll of the company or to update various data elements. In both the cases data should be correct, accurate and should be in proper format. This means that data should be validated, corrected and can be display in proper format.

By default in spreadsheet the numbers are right aligned and texts are left aligned. The spreadsheet can distinguish different types of numbers; recognise a date, a currency, or a percentage value or text etc. For example, if we type 16/04/1980 in a cell, spreadsheet will recognise it as a date and act accordingly. The software processes the data and generates the output; which should be in specific **format**. For example 1.5 might represent a value for one and half teaspoon in one spreadsheet while the same 1.5 would represent constant multiplier for age in another spreadsheet etc.

2.2.1 Data Entry

Excel also facilitates fast data entry; and automatically repeats data or can fill data in different cells (column wise or row wise.) For example, if we repeatedly type the days of the week in different cells instead of that we could use the **built-in data fill options to fill** the different cells with the days automatically. Some of the methods for data entry are mentioned below:

2.2.1.1 The data fill options

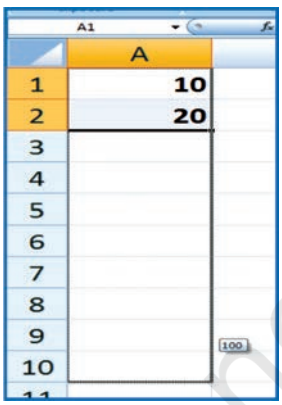

Figure 2.35

The **Fill** command can be used to fill data into worksheet cells (Figure 2.36 & 2.37. The Excel provides for entering data automatically to continue a series of numbers, number and text combinations, dates, or time periods, based on a pattern that we require. However, to fill quickly in several types of data series, we select cells and drag the **fill handle** (A Fill handle is the small black square in the lower-right corner of the selection. When we point to the fill handle, the pointer changes to a black cross (Refer Figure 2.34 and 2.35).

	A
1	10
2	20
3	30
4	40
5	50
6	60
7	70
8	80
9	90
10	100

Figure 2.34

The fill handle is displayed by default, Click the **Microsoft Office Button** , and then click **Excel Options**.

1. Click **Advanced**, and then under **Editing options**, clear or select the **Enable Fill handle and cell drag-and-drop** check box to hide or display the fill handle.

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2. To avoid replacing existing data when we drag the fill handle, to make sure that the **Alert before overwriting cells** check box is selected. If we don't want to receive a message about overwriting non-blank cells, we can clear this check box.

After we drag the fill handle, the **Auto Fill Options** button appears so that we can choose how the selection is filled. For example, we can choose to fill just cell formats by clicking **Fill Formatting Only**, or we can choose to fill just the contents of a cell by clicking **Fill Without Formatting**.

Option -1 Drag the fill handle to fill data into adjacent cells *(Figure 2.38)*

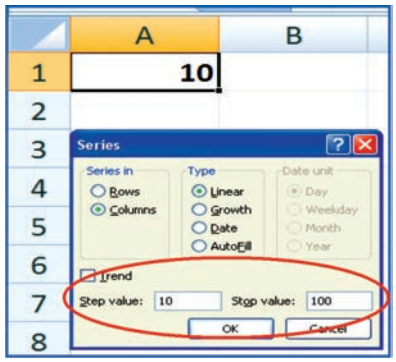

Figure 2.37

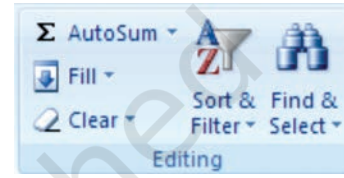

Figure 2.36

For **example,** we want to enter data in A1:A10 starting value from 10 and in step of 10 we will get 10, 20, ... 100 by using drag option as shown in the Figure 2.34 and Figure 2.35 respectively.

1. Select the cells that contain the data that we want to fill (A1:A2) into adjacent cells (A3:A10).
2. Drag the fill handle across the cells that we want to fill.

3. To choose how we want to fill the selection, click **Auto Fill Options**, and then click the option that we want.

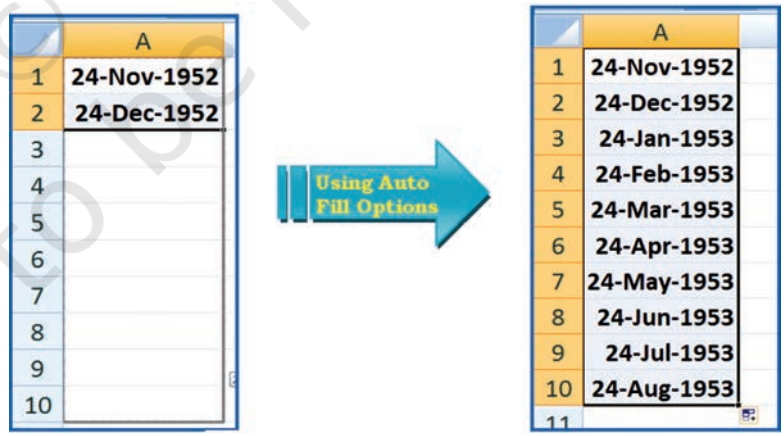

Figure 2.38

Option - 2 fill the active cell with the contents of an adjacent cell

1. Select an empty cell (A1) enter the value 10.
2. On the **Home** tab, in the **Editing** group, click **Fill**, and then click on **Series** option.

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3. The option window provides direction (row wise i.e., B1:J1 or column wise i.e., A2:A10) selection. The main option is **Step Value** (i.e. increment to the previous cell values in linear form) it is 10 in this example with respect to cell A1 and while another option is **Stop Value** (i.e. last value of the data when it is achieved the data fill stops) is 100 which may be in cell A10.
4. Once we enter the all the options and click **OK**, we get data filled in the series A1:A0 as 10:100 in step of 10.

Observe the another example for Date data we can use **fill handle** (it is important to note that all the cells of the columns or rows should be defined in (required) date data format using Format Cells). In this example we will enter date 24-11-1952 (or 24-Nov-1952) in cell A1 and 24-12-1952 (or 24-Dec-1952) in cell A2 and then use **Auto Fill Options** button between cells A3:A10; find the changes?

2.2.1.2 Import/Copy Data from other sources

One more method for data entry for any application we can use the following easiest method which will transfer data into required cells by copying or importing to Excel worksheet. These data files may be either in text files or non-text files format.

Text files can be directly read using a text editor such as Note pad in MS Windows. These files often have extension *.txt* but can have other extensions (such as .csv known as **C**omma **S**eparated **V**alues text file), easily read into Excel.

To import the data from a text file following steps are important for Figure 2.39.

1. Create data file using Notepad program of MS Windows (to get Notepad screen on desktop; click on Start button -> All Programs -> Accessories -> Notepad).
2. A comma-separated data values in one line of this text file is a row in a spreadsheet and each entry, separated by a comma, is a column entry for that row.
3. In the first line provides names for the columns of the spreadsheet.
4. In the next line onward start entering the data separate by comma as per the names given in first line.
5. It may possible that every data may not be of similar length but each data (even a blank data) should be separated by comma as per the names of the column.
6. Open a new Excel worksheet from the Office Button.

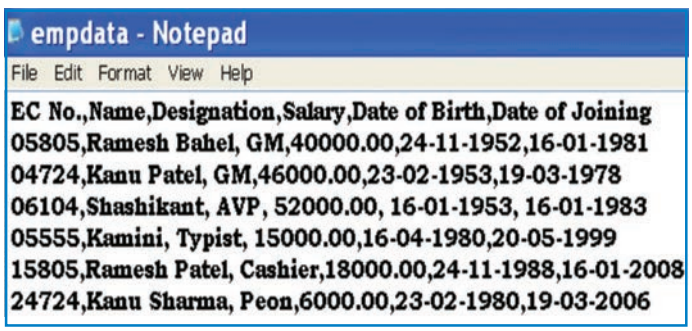

Figure 2.39

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7. Select Data Tab on the Ribbon.
8. On Data tab; an option Get External Data having From Text option.
9. Click on "From Text" which will allow selecting a Notepad file (Figure 2.40 & 2.41) saved as .cvm into Excel format directly and data will be copied into respective columns and rows.
10. Each and every data from Notepad file can be saved as an Excel data file This provides a lead that Excel worksheet consists of four types of data in cells: labels, values, date and formulas and data validation.

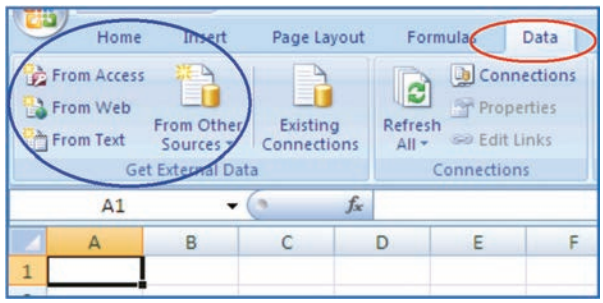

Figure 2.40

B14

	A	B	C	D	E	F
1	EC No.	Name	Designation	Salary	Date of Birth	Date of Joining
2	5805	Ramesh Bahel	GM	40000	24-11-1952	16-01-1981
3	4724	Kanu Patel	GM	46000	23-02-1953	19-03-1978
4	6104	Shashikant	AVP	52000	16-01-1953	16-01-1983
5	5555	Kamini	Typist	15000	16-04-1980	20-05-1999
6	15805	Ramesh Patel	Cashier	18000	24-11-1988	16-01-2008
7	24724	Kanu Sharma	Peon	6000	23-02-1980	19-03-2006

Figure 2.41

- **Labels** (text) are descriptive data such as names, months and usually include alphabetic characters. Excel aligns text to the left side of the cell.
- **Values** (numbers) are generally raw numbers or dates.
  - **Whole value:** If the data is a whole value, such as 34 or 5763, Excel aligns the data to the right side of the cell.
  - **Vale with a decimal:** If the data is a decimal value, Excel aligns the data to the right side of the cell, including the decimal point, with the exception of a trailing 0. For example, if we enter 246.75, then 246.75 displays; such as 246.70, will display as 246.7. We can change the display appearance, column width, and alignment of data.
- **Formulas** are instructions for Excel to perform calculations.
- **Date:** If we enter a date, such 16/12, Dec 16, or 16 Dec, Excel automatically returns 16-Dec in the cell, but the Formula bar displays 16/12/2008. (The Date format is dependent to Country Specific Format selection).

2.2.2 Data Validation

Data validation is a feature to define restrictions on type of data entered into a cell. We can configure data validation rules for cells data that will not allow users to enter invalid data, There may be warning messages when users tries to type wrong data in the cell. The messages also guide users to what input is expected for the cell, and instructions to correct any errors.

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Data validation is invaluable because it is necessary that data must be accurate and consistent. The different methods for data validation are as follows:

- **Create a Drop down List** – By this option pre-defined items names list is referred and restrict the users to select accordingly – e.g. In the organisation for a business application we want to restrict the

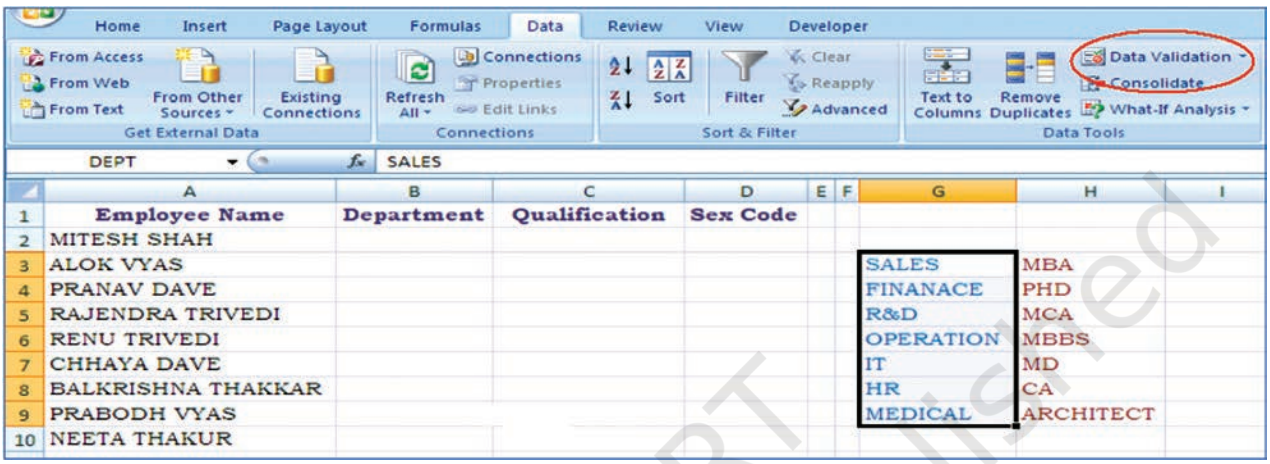

Figure 2.42

users not to enter the names of departments other than Sales, Finance, R&D, Operation, HR and IT, etc.; for qualification of each employee not to enter other than MBA, PHD, CA, MCA, ARCHITECT and MBBS, etc., and the Sex Code should be either "Male" or "Female" for the employees. Following are the steps described how to use drop down list: A **drop-down list** can be prepared in three different ways which can be used for data validation (Figure 2.42).

- Type a list of values separated by commas, i.e. using delimited list e.g. Male, Female
- Select the cells on the worksheet whose values can be used directly typed in a single row or single column
- Select the data in cells and create a Named Range to refer
  - Open a blank worksheet
  - Enter the column titles e.g Employee Name (cell A1), Department (cell B1), Qualification (cell C1) and Sex Code (cell D1) in the first row and four different columns respectively (Figure 2.42).

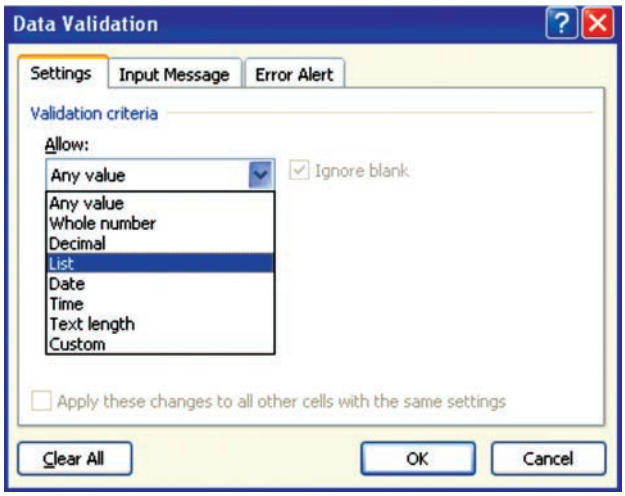

Figure 2.43

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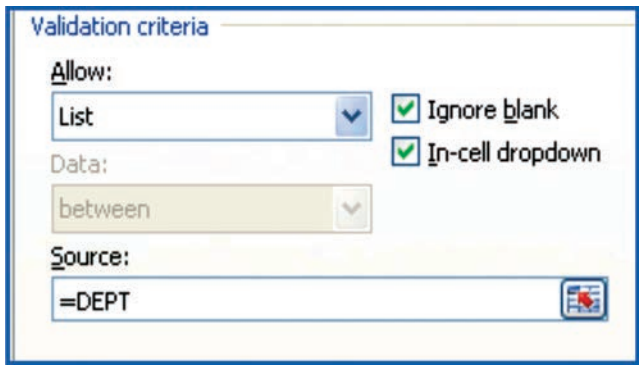

Figure 2.44

- Enter the Names of Employees in the column (a) (cells A2:A10).
- Prepare a list of department names some where in the worksheet (say G3:G9).
- Define the Named range (using Formula Tab ->Define Name on the ribbon) say DEPT .
- Select the column (b) e.g. Department (data to be validated in whole column).
- In the **Data Tab** of the ribbon click **Data Validation** on Data Tools opens three Data Validation Tabs (Figure 2.43). The first tab is Setting Tab select **List** for drop down list option.
- This option will display Validation Criteria and to provide valid data List in the Source where we have to type Name of the Range as =DEPT (Figure 2.44). The two more options also

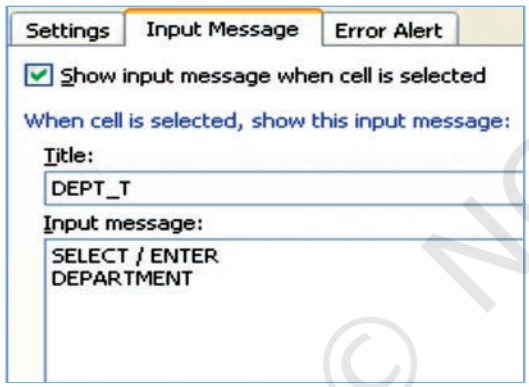

Figure 2.45

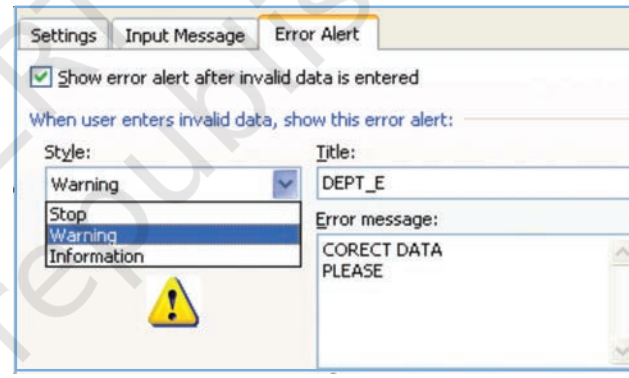

Figure 2.46

required clicking here one Ignore Blank box then empty or blank values won't be allowed and other is In-cell drop down.

- To display an input message when a cell (e.g. B2 later B3:B10) is selected, click the second tab on data validation option, i.e. **Input Message** Tab (Figure 2.45) and enter the desired text in the Title (e.g. DEPT_T) and provide an input short message for the user (e.g. SELECT/ENTER DEPARTMENT). Also tick the option to display this message when the cell is selected (Figure 2.46).
- To set the response settings when invalid data is entered into the cell click on the third tab of data validation option (Figure 2.46) i.e. **Error Alert** Tab. This tab enables :
  - (a) To display the error alert after invalid data is entered in the box.
  - (b) Enter message allows to type the desired message for user and title for reference purpose.

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(c) In Style drop-down menu select Information, Warning or Stop as per the severity and accuracy requirement for data where.

(i) **Information:** displays a message but will prevent entry of invalid data.

(ii) **Warning:** displays a warning message but will not prevent entry of invalid data.

(iii) **Stop:** will prevent invalid entry of data.

The steps discussed above are shown below in different diagrams (Figures 2.47(a) to 2.47(d)) which are self explanatory when data for Department are to be entered in the worksheet:

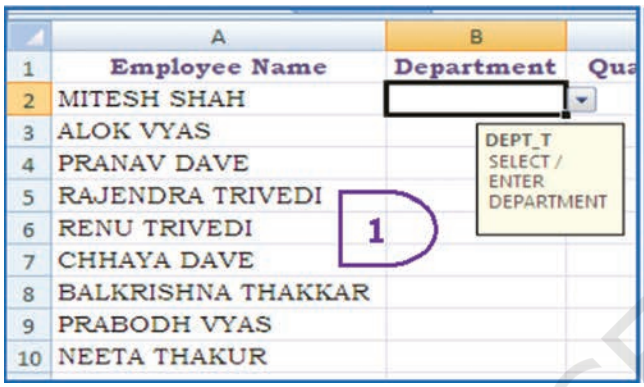

Figure 2.47 (a)

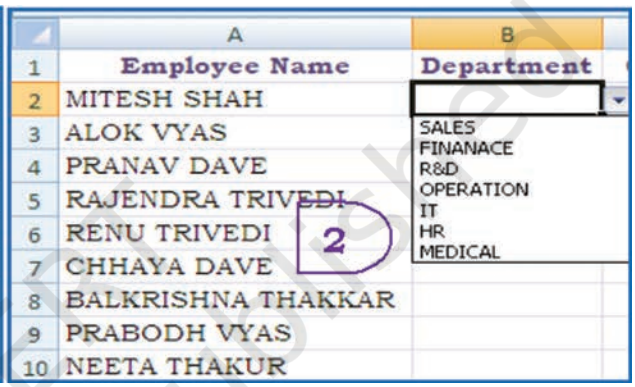

Figure 2.47(b)

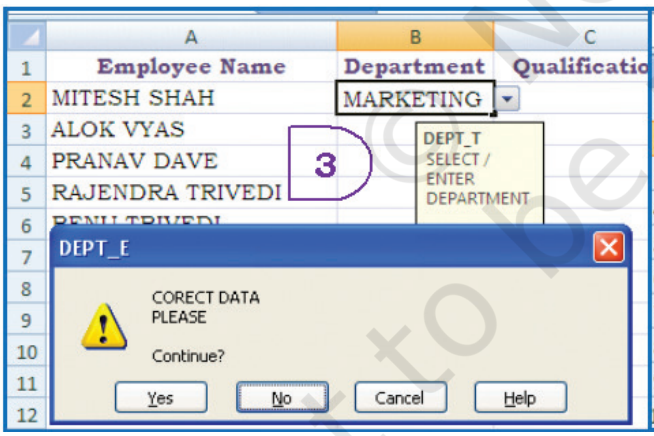

Figure 2.47(c)

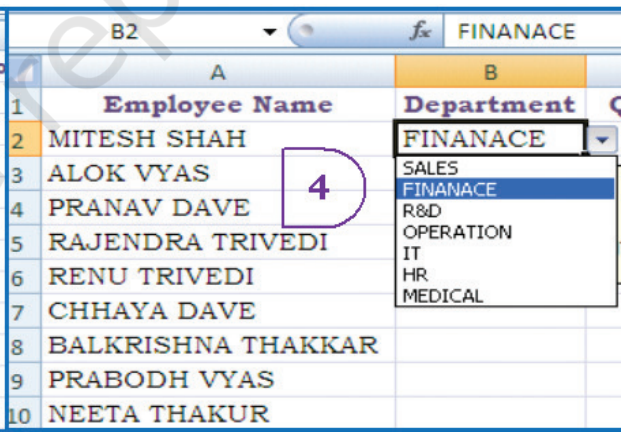

Figure 2.47(d)

To select data or reefing the limited number of data items we can type the list in the Source Box, separated by commas (Figure 2.43) e.g. as to enter the Sex Code either Male of Female for an Employee we can type as =Male, Female. This method of data validation is case sensitive; if a user types MALE, an error alert will be displayed.

- **Setting Limits –** As mentioned earlier in the **Allow** drop-down menu, select Whole Number, Decimal, Date, Time, or Text Length.

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For example in the same worksheet we can restrict the minimum age of an employee should be 18 and maximum age should be 58 (Age can be entered as **Whole Number** or can be entered Date of Birth as **Date** selection then age is calculated)**.**

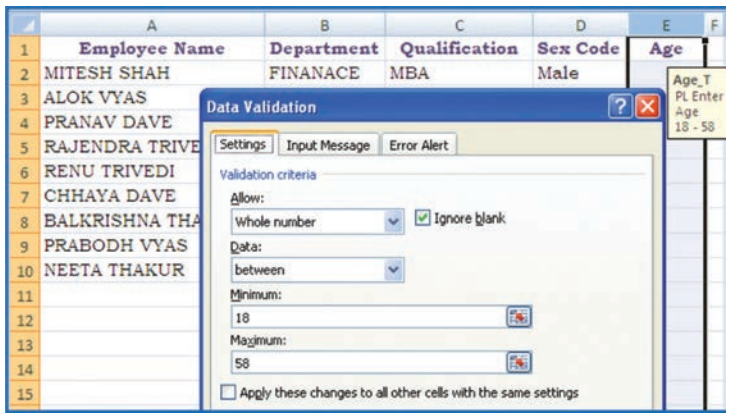

Figure 2.48

In this example if **Age** is a data element to be entered for every employee we will validate the Age as whole number and outside a specified range in a particular cell providing value in **Setting tab** (Figure 2.48) and data in between of minimum 18 and maximum 58 respectively.

Similarly we can check the number of text characters required in Employee Name column (for every employee) i.e. the cell should not contain blank data; and error message should be displayed e.g., we can limit the minimum number of characters in the Employee Name cell to 10 or less.

- **Setting Limits with a Formula –** To validate data based on formulas or values entered in other cells (Figure 2.49). The steps are as:
- In the **Allow** drop-down menu, select **Custom.**

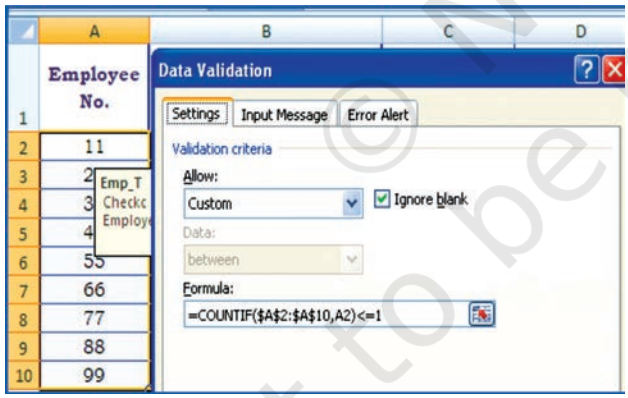

Figure 2.49

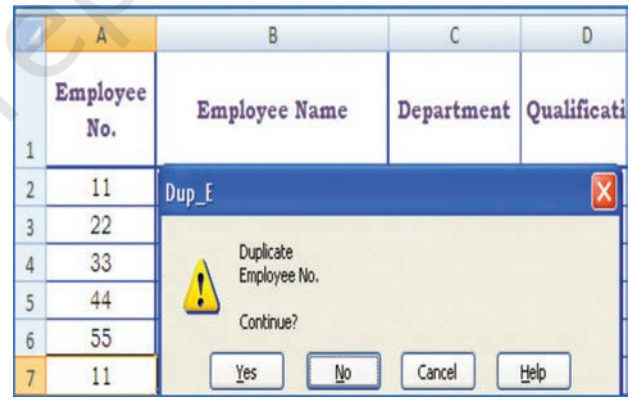

Figure 2.50

- In the **Formula** box, enter a formula that calculates a logical value. If the formula calculates TRUE entry will be valid. If the formula calculates FALSE entry will be invalid. The cell gives error message if the values are not meeting the conditions Some of the examples are as follows:
  - We can **prevent duplicate entries** in a range on the worksheet (Figure 2.50) i.e. suppose we check duplicate employee number or duplicate product code in the asset ledger or duplicate account

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code for the same item entered by user it shows the error.

- We can limit **the sum value** for a range which will cause error if sum of the values exceeds the given total, i.e. suppose the total amount of budget is fixed and sum of the distribution of the amount for different items in the range exceeds then it shows the error (Figure 2.50(a)

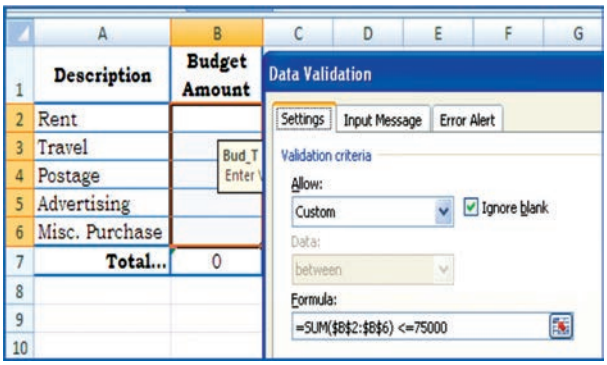

Figure 2.50(a)

- We can **prevent user from adding spaces before or after the text** in entry. The TRIM function removes spaces before and after the text. This formula checks that the entry is equal to trimmed entry (Figure 2.50(b).

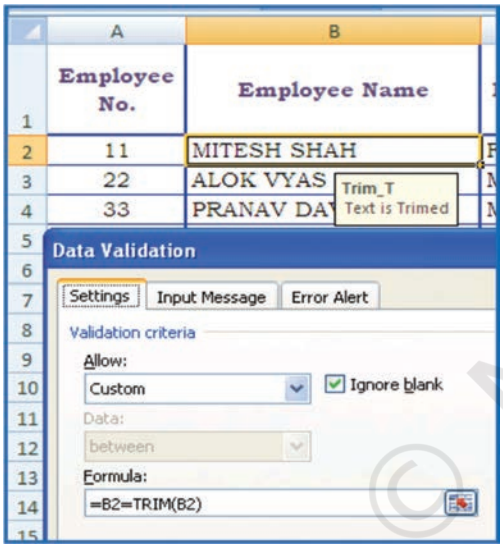

Figure 2.50(b)

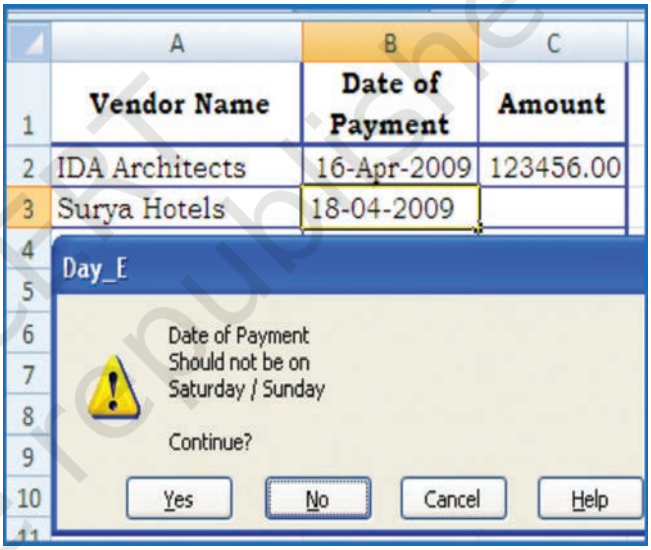

Figure 2.50(c)

- We **can prevent entry of dates that falls on (weekends or holidays) Saturday or Sunday** (or any other day). The WEEKDAY function returns the number for the date entered in the cell. If the value is 1(it is Sunday) and 7 (it is Saturday) then data entry is not allowed (Figure 2.50(c) and error message will be displayed.

2.2.3 Data Validation Form

To input data into a spreadsheet, often we type the data into cells directly. That's where data validation comes in handy. Instead of typing the same thing again and again, we can enter data into cells using

A form, whether printed or online, is a document designed with a standard structure and format that makes it easier to capture, organise, and edit information. A data form is a dialog box that displays one complete record at a time. Data forms can be used to add, change, locate, and delete records.

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drop-down lists or using **data input form**. Using a data form can make data entry easier than moving from column to column when we have more columns of data than can be viewed on the screen. To create input data form it is necessary that all the data names must be entered in the first row of the worksheet, because the input form refers these data names. To create input data form we have to select the tool as **Form** button to the Quick Access Toolbar .

The **Form** button has not been included on the user interface Ribbon, but we can still use it in Excel 2007 by adding at Quick Access Toolbar using following commands:

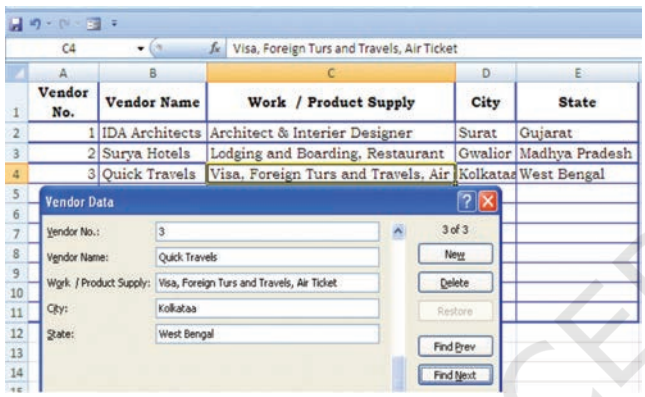

Figure 2.51

1. Click the arrow next to the **Quick Access Toolbar**, and then click **More Commands**.
2. In the **Choose commands from** box, click **All Commands**.
3. In the list box, select the **Form** button, and then click **Add**.

The data form is useful, when data are of in a simple form of text boxes that list the column headings as labels is sufficient and don't required sophisticated or custom form features, such as a list box or spin button.

Excel automatically generates a built-in data form (Figure 2.51). The data form displays all column headers as labels in a single dialog box. Each label has an adjacent blank text box in which we can enter data for each column, up to a maximum of 32 columns. In a data form, we can enter new rows, find rows by navigating or (based on cell contents) update rows and delete rows. If a cell contains a formula, the formula result is displayed in the data form, but we cannot change the formula by using the data form.

2.3 DATA FORMATTING

Formatting of spreadsheets makes easier to read and understand he important information (e.g. conditional formatting, number formatting, text and general spreadsheet formatting etc.). On the Ribbon there are several tools and shortcuts to format spreadsheets effectively. Some of them are described as follows:

2.3.1 Formatting Tools

The formatting tools for:

- **Number formatting** – Number formatting includes adding per cent symbols (%), commas (,), decimal places, and currency signs ($,

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Rs. etc), date, time, scientific values and as well as some special formats to a spreadsheet. The type of number format can be determined once the data is entered into the cell. Here are some examples:

- **Currency:** If we enter a financial value complete with the dollar/ currency sign and two decimal places, Excel assigns a Currency format to the cell alongwith the entry.
- **Percentages:** If we enter a value representing a percentage as a whole number followed by the per cent sign without any decimal places, Excel assigns to the cell the percentage format that follows this pattern along with the entry.

	A	B	C	D	E	F	G	H
1	Sales for Home AppliancesYear 2008_09							
2	(Figures in 000's)							
3		Q1	Q2	Q3	Q4	Actual	Target	In %
4	ALOK	40	57	52	65	214	250	0.856
5	PRANAV	50	69	69	90	278	220	1.2636
6	PRABODH	53	75	71	82	281	250	1.124
7	RAJENDRA	44	59	38	70	211	200	1.055
8	Total					984	920	1.0696
9	Reported on							
10	16-04-2009							

Figure 2.52(a)

- **Dates:** If we enter a date (dates are values, too) that follows one of the built-in Excel number formats, such as 16-04-2009 or 16-Apr-2009 the program assigns a Date format that follows the pattern of the date.

Example – Explaining below the steps to format range B4:E7 as currency with zero decimal places using negative preset format. The sample unformatted worksheet is shown in the Figure 2.52(a)

→ Select the range to format, i.e. B4:E7

→ From the Ribbon select, Home Tab with Number option, click on (Figure 2.52(b) to display **Format Cells** dialog box and choose **Number** tab.

→ The **Category** list shows all the preset formats available in Excel, grouped into categories. A sample corresponding to the current selection is shown at the top of the box.

→ Select the Category required i.e. **Currency**. The right hand side of the box shows the different symbols of currencies. It also shows the preset for negative values either minus sign (-) or red

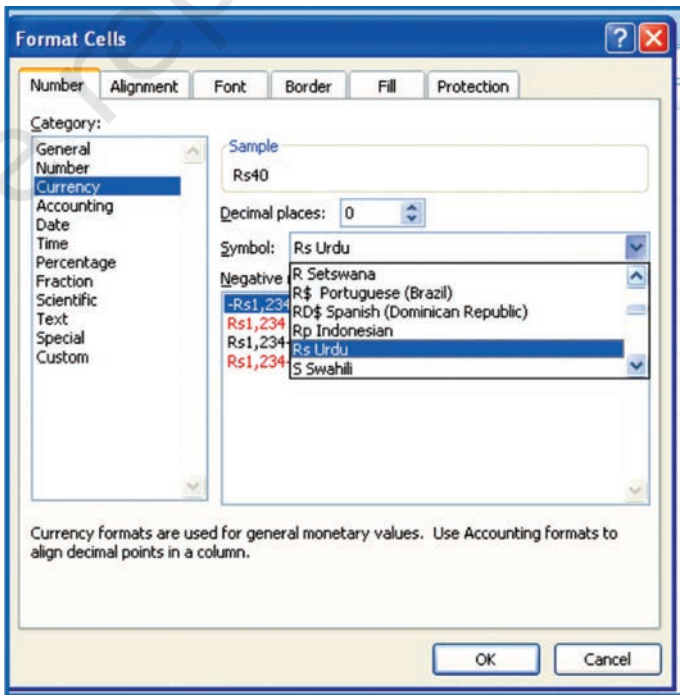

Figure 2.52(b)

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coloured number (if we do not want to display negative sign data).

→ Change the number of decimal places to Zero (0).

→ Click OK accept this format.

→ The output of these steps is shown in the Figure 2.52(c).

→ Similarly if we select the Category for the range H4:H8 as **Percentage** with Decimal Places to 2 digits. The Figure 2.52(d) will show the effect of this change.

	A	B	C	D	E	F	G	H
1	Sales for Home AppliancesYear 2008_09							
2	(Figures in 000's)							
3		Q1	Q2	Q3	Q4	Actual	Target	In %
4	ALOK	Rs.40	Rs.57	Rs.52	Rs.65	214	250	0.856
5	PRANAV	Rs.50	Rs.69	Rs.69	Rs.90	278	220	1.2636
6	PRABODH	Rs.53	Rs.75	Rs.71	Rs.82	281	250	1.124
7	RAJENDRA	Rs.44	Rs.59	Rs.38	Rs.70	211	200	1.055
8	Total					984	920	1.0696
9	Reported on							
10	16-04-2009							

Figure 2.52(c)

	A	B	C	D	E	F	G	H
1	Sales for Home Appliances Year 2008_09							
2	(Figures in 000's)							
3		Q1	Q2	Q3	Q4	Actual	Target	In %
4	ALOK	Rs.40	Rs.57	Rs.52	Rs.65	214	250	85.60%
5	PRANAV	Rs.50	Rs.69	Rs.69	Rs.90	278	220	126.36%
6	PRABODH	Rs.53	Rs.75	Rs.71	Rs.82	281	250	112.40%
7	RAJENDRA	Rs.44	Rs.59	Rs.38	Rs.70	211	200	105.50%
8	Total					984	920	106.96%
9	Reported on							
10	16-04-2009							

Figure 2.52(d)

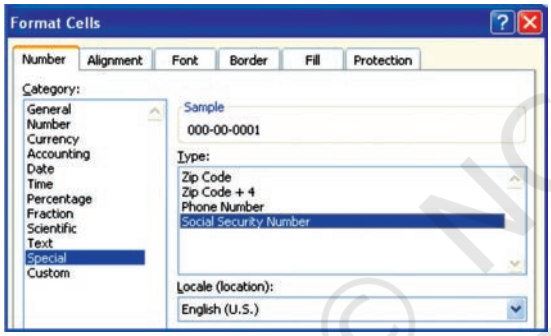

Figure 2.52(e)

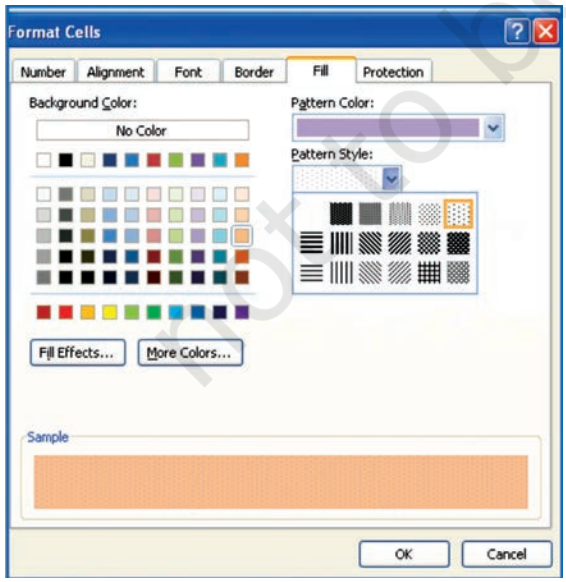

Figure 2.52(f)

- **Special Format Category**

Special category data (special numbers) such as phone numbers, zip codes, and Social Security numbers which require different format in a certain way (Figure 2.52(e). From the **Category** option we select *Special* and from corresponding drop-down box under the *Locale* we select format special numbers appropriate to specific countries.

- **Changing cell colours -**

→ Select the range to format (e.g. B4:E7 – Figure 2.52(c).

→ From the Ribbon select Home Tab with Number option, click on (Figure 2.42(b) to display **Format Cells** dialog box and choose **Fill** tab.

→ **Fill** tab provide Background Colour, Pattern Colour and Pattern Style options for the cell (or cell range to fill).

→ Select the colour required with desired pattern style and pattern colour from the Colour pallets (Figure 2.52(f).

→ Click OK and we see the result as given in Figure 2.52(g).

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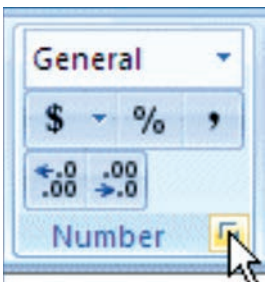
There is other number a format tool on the Ribbon for which allows number s to format aesthetically such as :

	A	B	C	D	E
1	Sales for Home Appliances Year 2008_09				
2	(Figures in 000's)				
3		Q1	Q2	Q3	Q4
4	ALOK	Rs.40	Rs.57	Rs.52	Rs.65
5	PRANAV	Rs.50	Rs.69	Rs.69	Rs.90
6	PRABODH	Rs.53	Rs.75	Rs.71	Rs.82
7	RAJENDRA	Rs.44	Rs.59	Rs.38	Rs.70

Figure 2.52(g)

In the Number section, click the Comma Style button. Then the thousand digit numbers or one hundred digit numbers will be display with a comma sign which makes it easier to read. Excel also allows more precise with these numbers, that's why it added two decimal values.



To remove the decimal values, in the Number section of the Ribbon, click the Decrease Decimal button. That removes one decimal value. Click the Decrease Decimal button again to remove another decimal value. Similarly we can use to Increase Decimal button twice.

To create own custom format, from the Format Cell dialog box, click the **Custom category** (Figure 2.52(h), select one of the existing formats, and then proceed to create by adding appropriate or subtracting undesired characters.

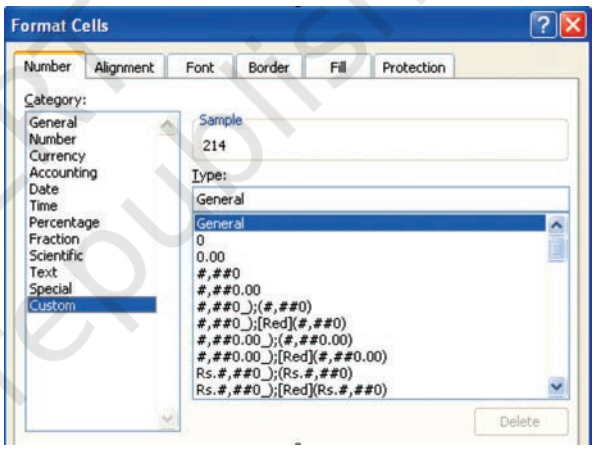


Figure 2.52(h)

We can find out the format used in a cell or some cells of unknown worksheet and can be changed by using the Format Cells dialog. In this case Right-click the mouse button for appropriate cell (s) or column (s) and choose Format Cells. In the Category list, select one of the formats as per characteristics from the right list or select the custom format.

Adding text formatting – The text formatting is mostly required for presentation of final output and aesthetically reading of the information. There may be display of the text or numbers in different **Fonts; Aligning in Cells**, **Changing Colour of Fonts**, **Merging of cell ranges to accommodate data** etc. (Figure 2.52(i & j)) When we insert a Text box, it looks quite plain. We can format text boxes to make them stand out on the worksheet; using the options from the Ribbon; on **Insert Tab** with

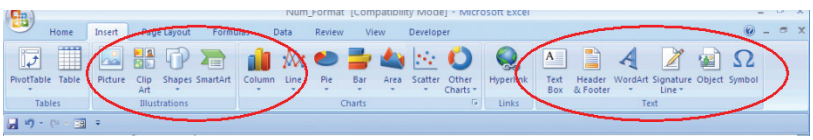


Figure 2.52 (i)

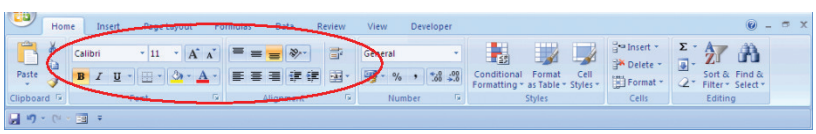


Figure 2.52 (j)

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the **Text dialog box.** We can use these drawing tools in dressing them up with special formatting commands (Figure 2.52(j)). These tools allow us to add decorative and explanatory material to worksheet and chart. How the **Illustrations Tools** or **Text Tools** can be used; let us understand from the example using both the tools bars together.

- **Change the font or font size in a worksheet** (Figure 2.52(j)) and Figure 2.52(j)

  1. Select the cell, **range** of cells, text, or characters that we want to format.
  2. On the **Home** tab, in the **Font** group, we will do the following:

     - To change the font, click the font that we want in the **Font** box.
     - To change the font size, click the font size that we want in the **Font Size** box , or click **Increase Font Size** or **Decrease Font Size** until the size we want is displayed in the **Font Size** box.

Figure 2.52(k)

- **Change the cell border** (Figure 2.52(k))

  1. On a worksheet, select the cell or range of cells that we want to add a border to, change the border style on, or remove a border from.
  2. On the **Home** tab, in the **Font** group, we will do one of the following:

     - To apply a new or different border style, click the arrow next to **Borders**, and then click a border style.
     - To remove cell borders, click the arrow next to **Borders**, and then click **No Border**.

The **Borders** button displays the most recently used border style. We can click the **Borders** button (not the arrow) to apply that style.

- **Create a custom cell border** (Figure 2.52(j) Figure 2.52(i)

We can create a cell style that includes a custom border, and can apply to that cell style when we want to display the custom border around selected cells.

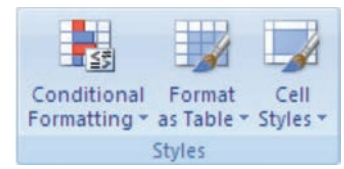

Figure 2.52(l)

  1. On the **Home** tab, in the **Styles** group, click **Cell Styles**.
  2. Click **New Cell Style**.
  3. In the **Style name** box, type an appropriate name for the new cell style.
  4. Click **Format**.

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5. On the **Border** tab, under **Line**, in the **Style** box, click the line style that we want to use for the border.
6. In the **Colour** box, select the colour that we want to use.
7. Under **Border**, click the border buttons to create the border that we want to use.
8. Click **OK**.
9. In the **Style** dialog box, under **Style Includes**, clear the check boxes for any formatting that we do not want to include in the cell style.
10. Click **OK**.
11. To apply the cell style, do the following:
12. Select the cells that we want to format with the custom cell border.
13. On the **Home** tab, in the **Styles** group, click **Cell Styles**.
14. Click the cell style that we want to apply.

- **Conditional Formatting**

Conditional formatting helps us for specific questions about data. We can apply conditional formatting to a cell range, a table, or a **PivotTable report**. There are important differences to understand when we use conditional formatting on a PivotTable report (Figure 2.52(k).

- **The benefits of conditional formatting** (Figure 2.52m)

To analyse data, we often ask ourselves some questions, such as:

→ Where are the exceptions in a summary of data over the past five years?

→ What is the trend in data over the past two years?

→ Who is responsible for such results during this month?

→ What is the overall age distribution of employees?

→ Which products have greater than 10% revenue increases from year to year?

→ Who are the highest performing and lowest performing students in the class?

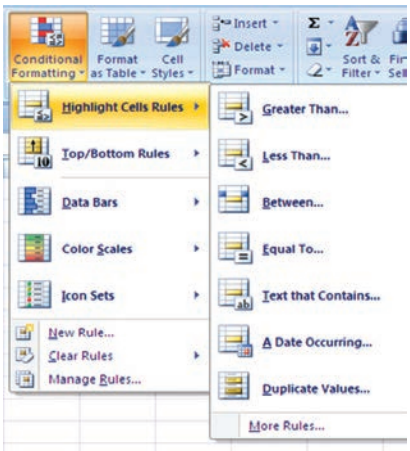

Figure 2.52(m)

Conditional formatting helps to answer these questions by making it easy to highlight interesting cells or ranges of cells, emphasise unusual values, and visualise data by using data bars, colour scales, and icon sets. A conditional format changes the appearance of a cell range based on a condition (or criteria). If the condition is true, the cell range is formatted based on that condition; if the conditional is false, the cell range is not formatted based on that condition.

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- Format all cells by using a colour scale

Colour scales are visual guides that help us to understand data distribution and their variation. A colour scale helps us to compare a range of cells by using a gradation of different colours. The shade of the colour represents higher or lower values. For example, in a green colour are higher value cells and red colour for lower value cells.

If one or more cells in the range contain a formula that returns an error, the conditional formatting is not applied to the entire range. To ensure that the conditional formatting is applied to the entire range, use an IS or IFERROR function to return a value other than an error value.

Figure 2.52(n)

1. Select one or more cells in a range, table, or PivotTable report.
2. On the **Home** tab, in the **Styles** group, click the arrow next to **Conditional Formatting**, and then click **Colour Scales**. (Figure 2.52(n).
3. Select a two-colour scale.

- **More than the two colours** (Figure 2.52(o)

1. **Select** one or more cells in a range, table, or PivotTable report.
2. On the **Home** tab, in the **Styles** group, click the arrow next to **Conditional Formatting**, and then click **Manage Rules**. The **Conditional Formatting Rules Manager** dialog box is displayed. Do one of the following:

- To add a conditional format, click **New Rule**. The **New Formatting Rule** dialog box is displayed.
- To change a conditional format, do the following:

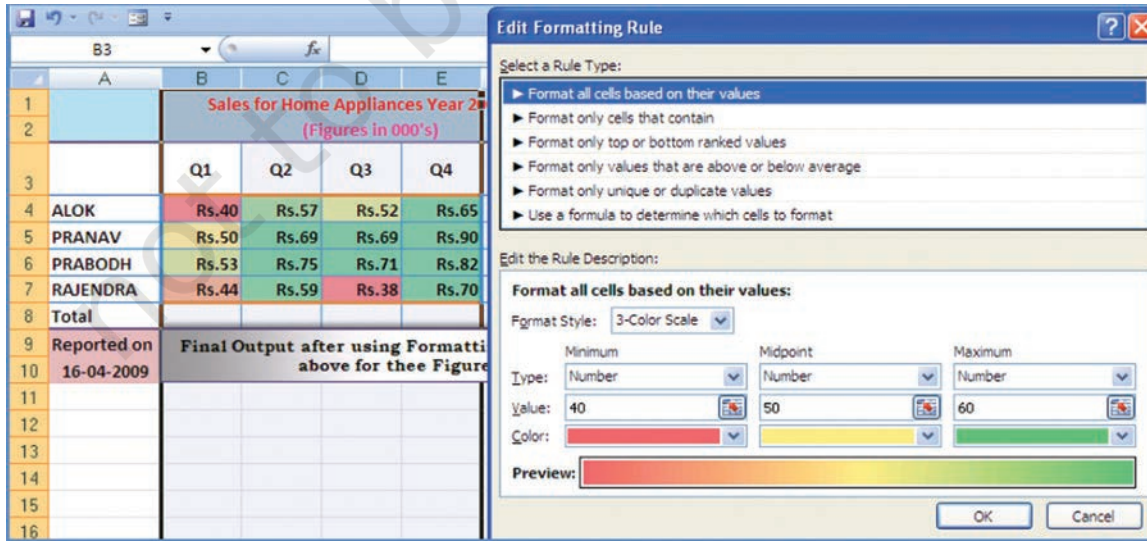

Figure 2.52(o)

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1. Make sure that the appropriate worksheet, table, or PivotTable report is selected in the **Show formatting rules for** list box.
2. Optionally, change the range of cells by clicking **Collapse Dialog** in the **Applies to** box to temporarily hide the dialog box, by selecting the new range of cells on the worksheet, and then by selecting **Expand Dialog**.
3. Select the rule, and then click **Edit rule**. The **Edit Formatting Rule** dialog box is displayed.
4. Under **Select a Rule Type**, click **Format all cells based on their values**.
5. Under **Edit the Rule Description**, in the **Format Style** list box, select **3-Colour Scale**.
6. To select a **Minimum** and **Maximum Type** do one of the following:
   - **Format lowest and highest values** Select **Lowest Value** and **Highest Value**. In this case, we do not enter a **Minimum** and **Maximum Value**.
   - **Format a number, date, or time value** Select **Number**, and then enter a **Minimum** and **Maximum Value**.
   - **Format a percentage** Select **Per cent**, and then enter a **Minimum** and **Maximum Value**. Valid values are from 0 (zero) to 100. Do not enter a per cent sign. Use a percentage when we want to visualise all values proportionally because the distribution of values is proportional.
   - **Format a percentile** Select **Percentile** and then enter a **Minimum** and **Maximum Value**. Valid percentiles are from 0 (zero) to 100.

Percentile is usually used we want to visualise a group of high values (such as the 20th percentile) in one colour grade proportion because they represent extreme values that might skew the visualisation of the data.

   - **Format a formula result** Select **Formula**, and then enter a **Minimum** and **Maximum Value**.

The formula must return a number, date, or time value. Start the formula with an equal sign (=). It's a good idea to test the formula in the worksheet to make sure that the formula doesn't return an error value.

- **Changing the alignment of data in cells** (Figure 4.52(p)

There are several options to change the alignment of text (data) in cells

Text layout

Vertical alignment – To specify the vertical position of the text in a shape, select an option from the list (or from the tool box).

Text direction – To specify the orientation of the text in a shape, select an option from the list.

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2. Autofit

Resize shape to fit text - To increase the size of the shape vertically so that the text fits inside of it, click this button.

3. Internal margin

The internal margin is the **distance** between the text and the outer border of a chart element. We can **increase** or **decrease** the amount of this space by using the following options.

Left – To specify the distance between the left border of the selected chart element and the text, enter the margin number that we want in the **Left** box.

Right – To specify the distance between the right border of the selected chart element and the text, enter the margin number that we want in the **Right** box.

Top – To specify the distance between the top border of the selected chart element and the text, enter the margin number that we want in the **Top** box.

Bottom – To specify the distance between the bottom border of the selected chart element and the text, enter the margin number that we want in the **Bottom** box.

Columns – To specify the number of columns of text in a chart element and the spacing between the columns, click this button.

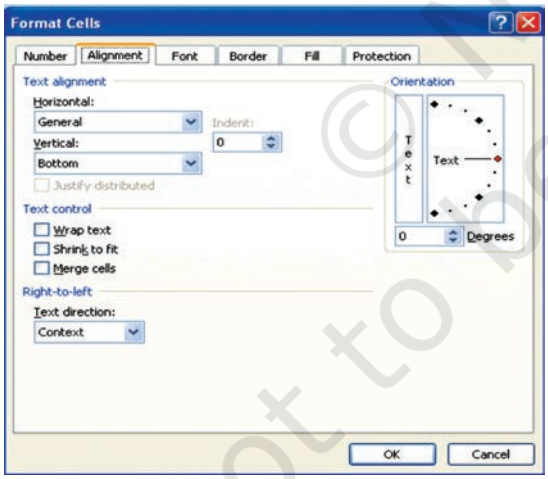

Figure 2.52(p)

The commands for this

- ☞ Select the range.
- ☞ Click on Home tab for **Alignment** options which displays the dialog box and select the alignment tab (Figure 2.38(n)(1).
- ☞ Select **horizontal** and **vertical** as alignment required.
- ☞ There are other options to display text at angular orientation or text to be control within cell or to spread within the cell.
- ☞ Click OK.

- **Merging a range of Cells**

Merged cells are a single cell that is created by combining two or more selected cells. The cell reference for a merged cell is the upper-left cell in the original selected range. When two or more adjacent horizontal or vertical cells are merged, the cells become one large cell and displayed across multiple columns or rows. The contents of one appear in the centre of the merged cell.

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1. Select two or more adjacent cells that we want to merge.
2. On the **Home** tab, in the **Alignment** group, click **Merge and Centre**. (Or button).
3. The cells will be merged in a row or column, and the cell contents will be centered in the merged cell. To merge cells without centering, click the arrow next to **Merge and Centre**, and then click **Merge Across** or **Merge Cells**. The cell address of merge cells will be the address of lower active cell.
4. To change the text alignment in the merged cell, select the cell; click any of the alignment buttons in the **Alignment** group on the **Home** tab.

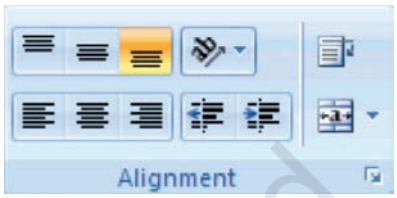

Figure 2.52(q)

- **Split a merged cell** (Figure 2.52(q)
  1. Select the **merged** cell.
  2. When we select a merged cell, the **Merge and Centre** button also appears selected in the **Alignment** group on the **Home** tab.
  3. To split the merged cell, click **Merge and Centre**. The contents of the merged cell will appear in the upper-left cell of the range of split cells.

- **Formatting a Table**

There are predefined table styles (or quick styles) that we can use to quickly format a table. If the pre-defined table styles don't meet our needs, we can create and apply a custom table style.

The table formatting by choosing Quick Styles options for table elements, such as header and total rows, first and last columns, and banded rows and columns.

- **To choose a table style to create a table** (Figure 2.52(r))
  1. On the worksheet, select a range of cells that we want to quickly format as a table.

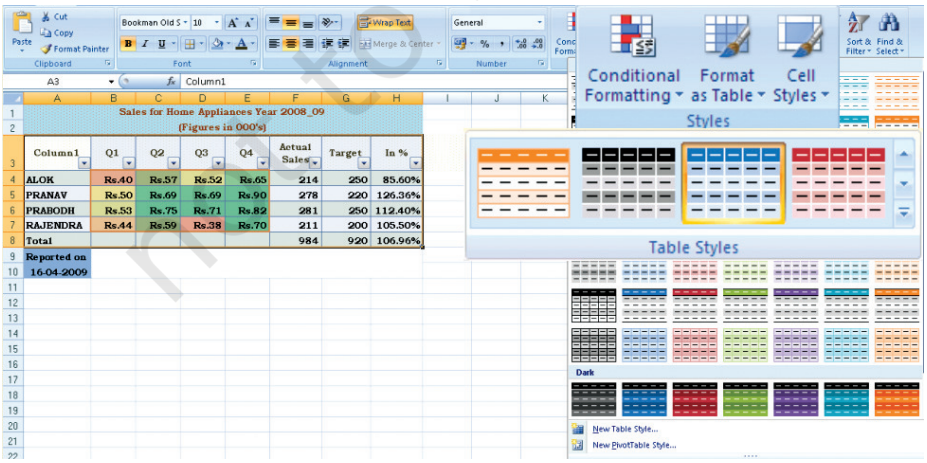

Figure 2.52(r)

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2. On the **Home** tab, in the **Styles** group, click **Format as Table**.
3. Under **Light**, **Medium**, or **Dark**, click the table style that we want to use.

Apply a table style to an existing table

1. On the worksheet, select the table to which we want to apply a table style.
2. On the **Design** tab, in the **Table Styles** group, do one of the following:
   - Click the **More** button, from the dropdown menu, click the table style (Light, Medium or Dark) that we want to use.

- **Using the NOW function to add the current date to the spreadsheet**

NOW ( ) is the function returns the serial number of the current date and time. If the cell format was **General** before the function was entered, the result is formatted as a date.

Excel stores dates as sequential serial numbers so they can be used in calculations. By default, January 1, 1900 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900. Numbers to the right of the decimal point in the serial number represent the time; numbers to the left represent the date. For example, the serial number 0.5 represents the time 12:00 noon.

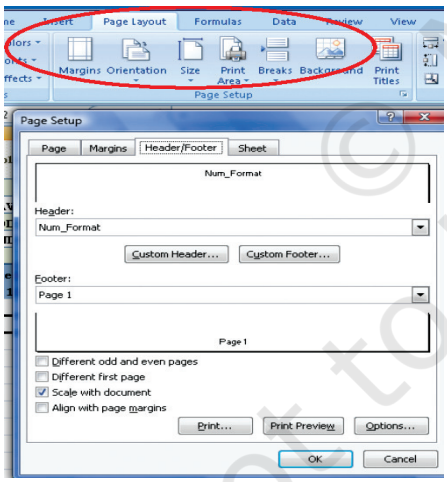

Figure 2.53(a)

- **Adding Headers and Footers to Excel Spreadsheet**

In spreadsheet, headers and footers are lines of text that are printed at the top (header) and bottom (footer) of each page in the spreadsheet. They contain descriptive text such as titles, dates, and/or page numbers and are used to add information to a printed spreadsheet.

The headers and footers options are available in **Page Layout view** (Figure 2.53(a). For other sheet types, such as chart sheets or for embedded charts we can work with headers and footers in the **Page Setup** dialog box.

Add or change the header or footer text for a worksheet in Page Layout view

1. Click the worksheet to which we want to add/change headers or footers.
2. On the **Insert** tab, in the **Text** group, click **Header and Footer**. (refer Figure 2.53(b)) Or Do one of the following:
   - To add a header or footer, click the left, centre, or right header or footer text box at the top or at the bottom of the worksheet page.

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- To change a header or footer, click the header or footer text box at the top or at the bottom of the worksheet page that contains header or footer text, and then select the text that we want to change.

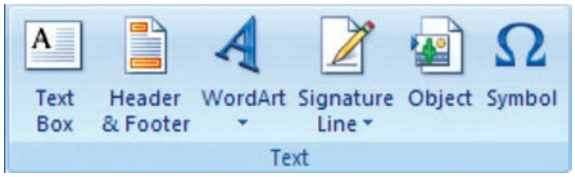

Figure 2.53(b)

3. Type the text that we want.

- **Use Format Painter**

  To copy quickly formatting from one cell or group of cells to another part of the spreadsheet uses the format painter. This feature is very useful when extending a spreadsheet and we need to format the newly added cells to match the original ones.

- **Use of AutoFormat Option**

  To quickly apply a number of formatting features to a spreadsheet we can use one of the 17 AutoFormat styles available (in Excel 2007). These styles combine a number of formatting options that will instantly give our spreadsheet a professional look.

2.4 OUTPUT REPORTS

We can print entire or partial worksheets and workbooks, one at a time, or several at once. The MS Excel can print just the Excel table or also it provides to:

(a) Print a partial or entire worksheet or workbook.

(b) Print several worksheets at once.

(c) Print several workbooks at once.

(d) Print an Excel table.

(e) Print a workbook to a file.

(f) Print a graphic Charts and Pivot Tables.

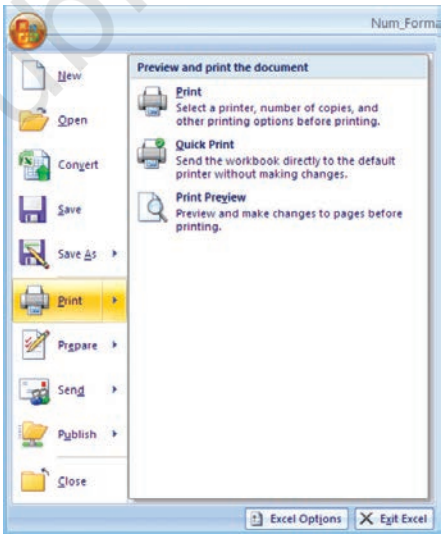

Figure 2.54

We can also print a workbook to a file instead of to a printer. This is useful when we need to print the workbook on a different type of printer from the one to another printer. The printing option is available to print quickly or to preview the printout before printing, click **Microsoft Office Button**, click the arrow next to **Print**, and then click **Quick Print** or **Print Preview** (Figure 2.54). To print worksheet or table; basic preparation for printing is required and describe below:

2.4.1 Defining the Print Area

By default, Excel prints all data on the current worksheet but for specific and formatted print we have to define print area from the Page Setup dialog box or the Print Area command from the Page Layout option of the Ribbon (Figure 2.55).

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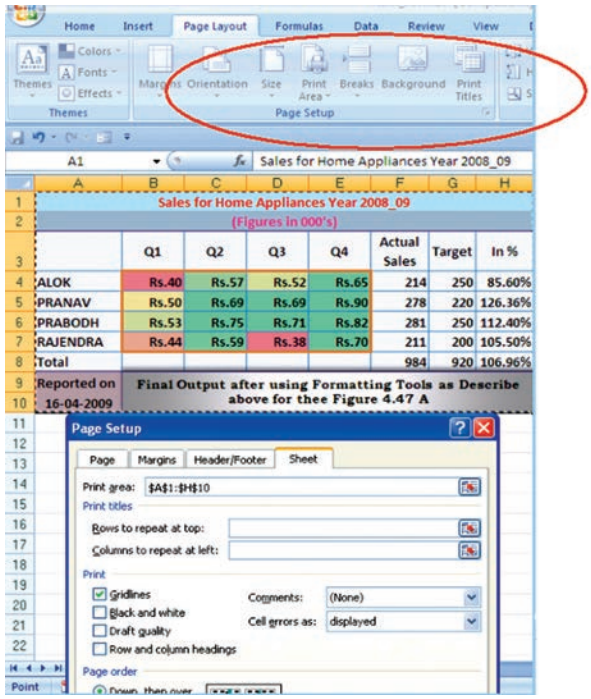

Figure 2.55

- **The Print Area using Dialog Box Option**

1. **Select the** Page Layout **command tab on the Ribbon.**
2. **In the *Page Setup* group, click** Page Setup**. The *Page Setup* dialog box appears.**
3. **Select the** Sheet **tab.**
4. In the *Print Area* text box, type the range of cells you want to print **or** to select the area –
   a. Click **Collapse Dialog**
   b. Select the desired range of cells
   c. Click **Restore Dialog**
5. Click **OK** and the print area is defined.

- **The Print Area using Print Area Option**

Excel keeps the print area defined until it is cleared or replaced. To set the print area:

1. Select the range of cells to print (e.g. A1:H10 of Figure 2.55)
2. **Select the** *Page Layout* **command tab**
3. **In the *Page Setup* group, click** Print Area» **select** Set Print Area. **The print area is set.**
4. OPTIONAL: To add more data to the print area
   a. select a range of cells
   b. In the *Page Setup* group, click **Print Area**» select **Add to Print Area;** the selected cells are added to any previously selected data.
   c. Repeat steps **a** and **b** as necessary.

- To clear the print area

1. **In the *Page Setup* group, click** Print Area» **select** Clear Print Area

Printing Ranges of Cells

We can manually select ranges of cells for printing and also have the option of selecting multiple non-contiguous ranges for printing.

- To select Print Range manually (using key board only)

1. Select the range of cells to be printed
   or
   From the *Name Box* pull-down list, select the range name to be printed.

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2. In the top left corner of the Excel window, click the **Office Button**» select ***Print* or** Press **[Ctrl]** + **[P]** the *Print* dialog box appears.
3. In the *Print what* section, select ***Selection.***
4. Click **OK.** The specified range of cells is printed.

- To select Print Multiple Ranges

  Excel facilitates to print non-contiguous ranges. Selected ranges will print on separate pages.

1. Select the first range to be printed.
2. Press **[Ctrl]** + select the second range to be printed .
3. For each additional range to be printed, repeat step 2.
4. In the top left corner of the Excel window, click the **Office Button** – select ***Print* OR** Press **[Ctrl]** + **[P]**. The *Print* dialog box appears.
5. In the *Print what* section, select ***Selection.***
6. Click **Print.** The specified range of cells is printed.

2.5 PREPARATION OF REPORTS USING PIVOT TABLE

A Pivot Table is way to present information in a report format. A PivotTable report often provides enhanced layout, attractive and formatted report with improved readability. This report is prepared from the spreadsheet once we add the fields with appropriate level of details, calculations and group the data as per required information. The Pivot Table uses a List Data Table (Database).

*A **data table** is a range of cells that shows the results of substituting different values in one or more formulas. There are two types of data table: One-variable and two-variable.*

***One-variable data table** (Figure 2.56(a) Formula used in a one-variable data table must refer to an input cell. The input cell is a cell used by Excel in which each input value from a data table is substituted (column-oriented, i.e. input cell down one column or row-oriented, i.e. across one-row).*

***Two-variable data table** (Figure 2.56(b) use only one formula with two lists of input values. The formula must refer two different input cells.*

2.5.1 One-variable data table

- C1 cell is an input cell. We will create one-variable data table which calculates the increase in the budget corresponding to each of the possible increase in costs.
- If the data table is column-oriented, type the formula (=A2*C1) in the row (row number 4) above the first value (in cell B5) and one cell to the right (in cell C4) of the column of values (Figure 2.56).

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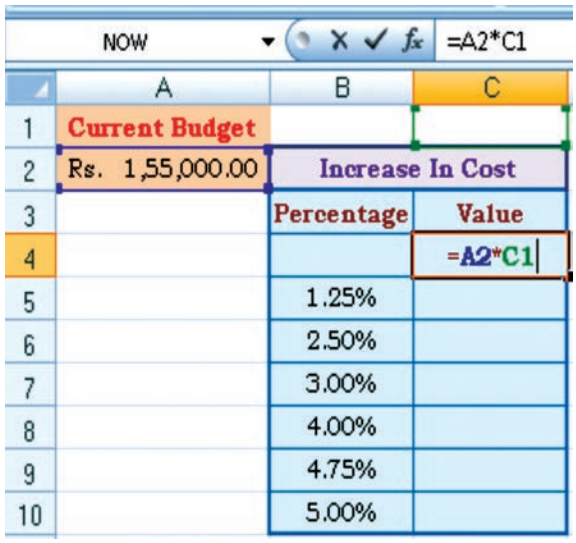

Figure 2.56

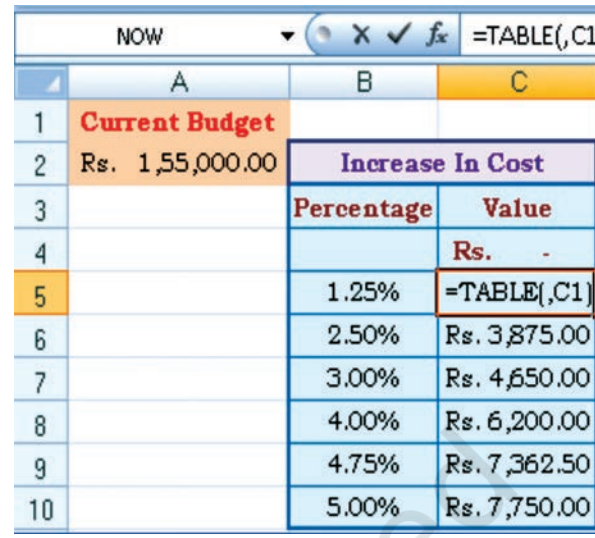

Figure 2.56(b)

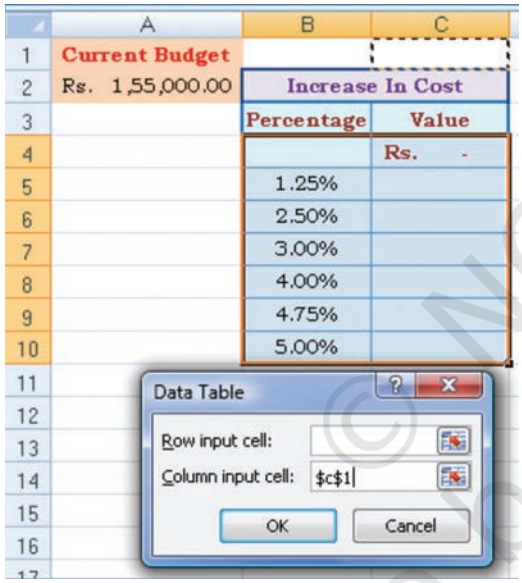

Figure 2.56(a)

- Enter a column of values from B5:B10.
- Select all cells in the range B4:C10(Fig 2.56(a).
- On the **Data** tab on the Ribbon, in the **Data Tools** group, click **What-if-Analysis**, and then click **Data Table** (Figure 2.56(b)**.**
- In the **Row input cell box** no entry.
- In the **Column input cell box**, enter $C$1
- Click **OK** to generate table.

2.5.2 Two-variable data table (Figure 2.57)

This we will learn by one simplest example generating a mathematical table in which two input cells uses B1 and C1 to generate a 15×15 multiplication table by multiplying each other.

- In a cell B2 on the worksheet, enter the formula (= B1 *C1) that refers to the two input cells.

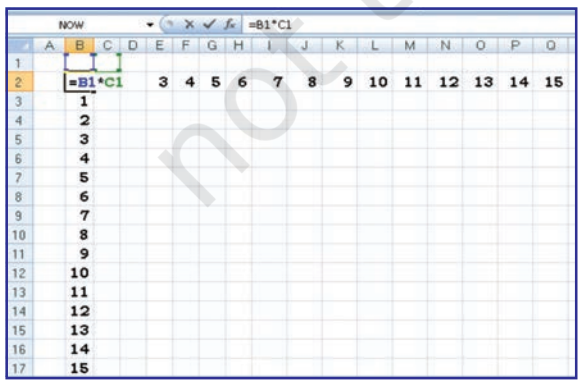

Figure 2.57

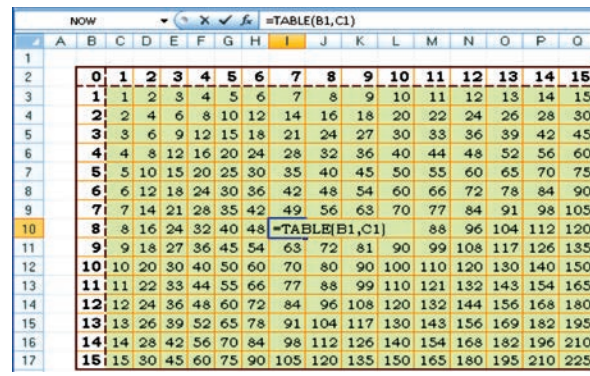

Figure 2.57 (a)

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- Type one list of input values in the same column below the (or fill the series from 1 to 15 in B3:B17).
- Type the second list in the same row (or fill the series from 1 to 15 in C3:Q3), to the right of the formula.
- Select the range of cells that contains the formula and both the row and column of values i.e. B2:Q17.
- On the **Data** tab on the Ribbon, in the **Data Tools** group, click **What-if-Analysis**, and then click **Data Table.**
- In the **Row input cell box** enter $B$1.
- In the **Column input cell box**, enter $C$1.
- Click **OK** to generate table (Figure 2.57(a))

	A	B	C	D	E	F	G	H	I
1	Day	City	Vegetable	Actual	Surplus		City	Vegetable	Quota
2	Monday	Chennai	Carrots	17	2		Mumbai	Carrots	15
3	Monday	Chennai	Onions	8	0		Mumbai	Onions	8
4	Monday	Chennai	Potatoes	20	-8		Mumbai	Potatoes	28
5	Monday	Delhi	Carrots	23	8		Chennai	Carrots	17
6	Monday	Delhi	Onions	6	-2		Chennai	Onions	7
7	Monday	Delhi	Potatoes	20	-8		Chennai	Potatoes	21
8	Monday	Kolkatta	Carrots	15	-2		Delhi	Carrots	15
9	Monday	Kolkatta	Onions	10	3		Delhi	Onions	8
10	Monday	Kolkatta	Potatoes	21	0		Delhi	Potatoes	28
11	Monday	Mumbai	Carrots	19	4		Kolkatta	Carrots	18
12	Monday	Mumbai	Onions	9	1		Kolkatta	Onions	9
13	Monday	Mumbai	Potatoes	29	1		Kolkatta	Potatoes	22

Figure 2.58

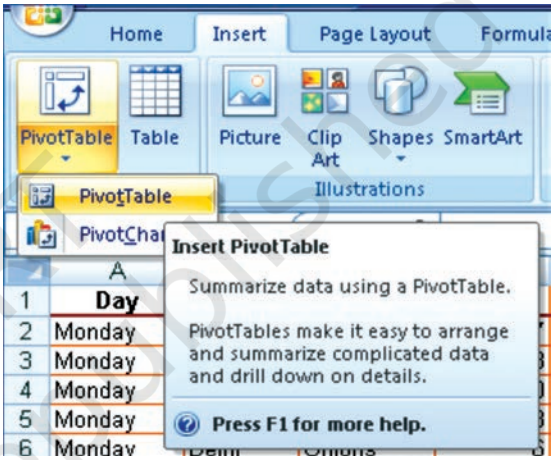

Figure 2.58(a)

2.5.3 Pivot Tables

The Pivot Table feature allows us to create a cross tabulation summary of data in which heading can subsequently moved to give different views of the data. We will understand with the help of following example.

Example: A spreadsheet (Figure 2.58) provides the data for consumption from D2:D37 (in Metric Tons) of three different vegetables namely Carrot, Onions and Potatoes during the three days of the week in four different metro cities. The quota of consumption is fixed by Food Department to supply of these vegetables in the city. The spread sheet shows the Actual Consumption and Surplus (i.e. = actual – quota).

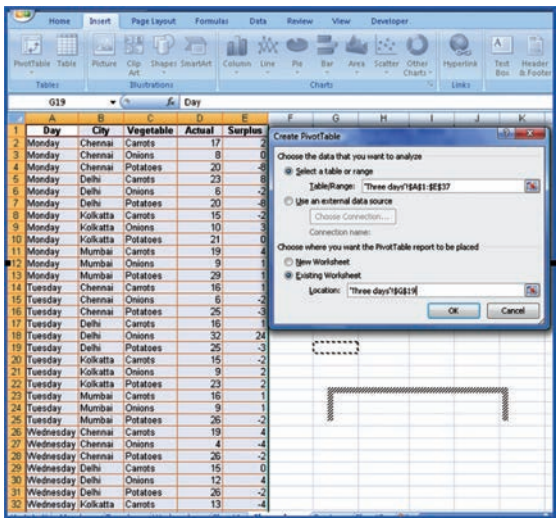

Figure 2.58(b)

- Click the data from A1: E37
- On the **Insert** tab on the Ribbon, in the **Tables** group, click **Pivot Table**, and then click **Pivot Table** to start Pivot Table Report interactive options (Figure 2.58(a) as **Create Pivot Report** (Figure 2.58(b).
- Enter the data location
- Choose to place the Pivot table on an Existing worksheet (say G19).

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- Click OK to display a blank Pivot table and **filed list** (Figure 2.58(c) and Excel displays the Pivot Table Toolbar

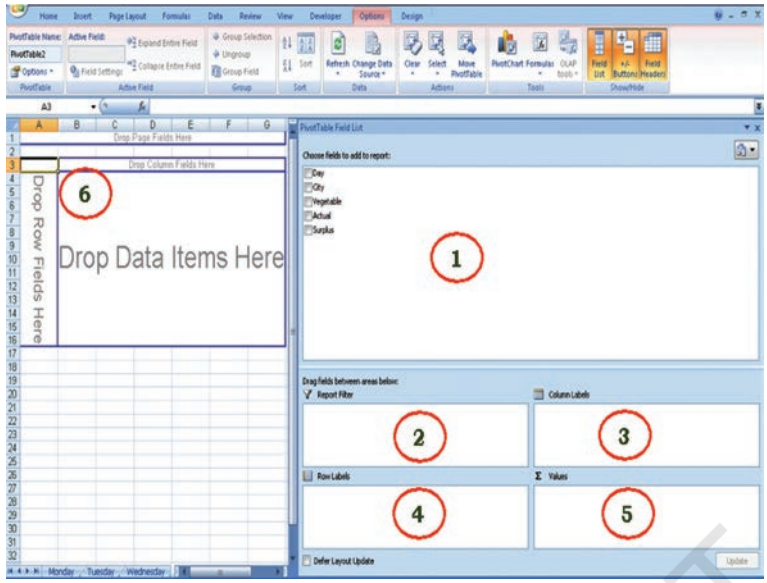

Figure 2.58(c)

1. Drag the Field Names (From location number 1) to the require positions in the pivot table (location Number 6).
2. Report Filter "Day"
3. Column Label "Vegetable"
4. Row Label "City"
5. Values "Sum of Actual" and the final result will be displayed (Figure 2.58(d).
6. In the above selections at Row Label we give "City" and then "Vegetable"; while in column Label if we do not enter any selection. The Pivot Report will be as shown in Figure 2.58(e).

	A	B	C	D	E
1	Day	(All)			
2					
3	Sum of Actual	Vegetable			
4	City	Carrots	Onions	Potatoes	Grand Total
5	Chennai	52	18	71	141
6	Delhi	54	50	71	175
7	Kolkatta	43	25	66	134
8	Mumbai	50	30	81	161
9	Grand Total	199	123	289	611

Figure 2.58(d)

	A	B	C
1	Day	(All)	
2			
3	Sum of Actual		
4	City	Vegetable	Total
5	Chennai	Carrots	52
6		Onions	18
7		Potatoes	71
8	Chennai Total		141
9	Delhi	Carrots	54
10		Onions	50
11		Potatoes	71
12	Delhi Total		175
13	Kolkatta	Carrots	43
14		Onions	25
15		Potatoes	66
16	Kolkatta Total		134
17	Mumbai	Carrots	50
18		Onions	30
19		Potatoes	81
20	Mumbai Total		161
21	Grand Total		611

Figure 2.58(e)

The Pivot Table tool bar (Figure 2.58(f) provides various flexibility to work on data.

Figure 2.58(f) : Pivot Table Toolbar

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Advantages of Pivot Table (Report)

A PivotTable report is an interactive way to quickly summarise large amounts of data. Use a PivotTable report to analyse numerical data in depth and to answer unanticipated questions about data. A PivotTable report designed for:

- Querying large amounts of data in user-friendly ways. Sub totaling and aggregating numeric data, summarising data by categories and subcategories, and creating custom calculations and formulas.
- Expanding and collapsing levels of data to focus on results, and providing from details to the summary of data for areas of interest.
- Moving rows to column or columns to rows (or "pivoting") to see different summaries of the source data.
- Filtering, sorting, grouping, and conditionally formatting the most useful and the interesting subset of data to enable us to focus on the information that we want.
- Presenting concise, attractive, and annotated online or printed reports.
- The use of a PivotTable report is to analyse related totals, when we have a long list of figures to sum and to compare several facts about each figure.

2.6. COMMON ERRORS (MESSAGES) IN SPREADSHEET

4.1.1 Mark common formula errors

1. Click the **Microsoft Office Button**, click **Excel Options**, and then click the **Formulas** category.
2. In the **Error Checking** section, select the **Enable background error checking** check box.
3. To change the colour of the triangle that marks where an error occurs, in the **Indicate errors using the colour** box, select a new colour.
4. Select a cell with a triangle in the top-left corner of a cell.
5. Next to the cell, click the **Error Checking** button that appears, and then click the option that we want. The commands are different for each type of error, and the first entry describes the error. If we click **Ignore Error**, the error is marked to be ignored for each consecutive check.
6. Repeat the two previous steps.

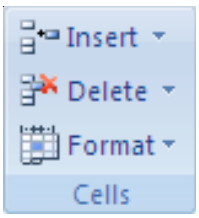

Figure 2.59

- **Correct an error value**

If a formula cannot properly evaluate a result, e Excel will display an error value. Each error type has different causes, and different solutions. Some are discussed here to understand them properly before redo the operation

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- **Correct a ##### error**

This error occur when a column is not wide enough, or a negative date or time is used.

Reason: The column is not wide enough to display the content

1. Select the column by clicking the column header.
2. On the **Home** tab, in the **Cells** group, click **Format**, and then click **AutoFit Column Width**. Alternatively also we can double-click the boundary to the right of the column heading.
3. Select the column.
4. On the **Home** tab, in the **Cells** group, click **Format**, click **Format Cells**, and then click the **Alignment** tab.
5. Select the **Shrink to fit** check box.

Dates and times are negative numbers

When a date or time is typed in a cell, it appears in a default date and time format. The default date and time format is based on the Regional date and time settings that are specified in Windows Control Panel, and changes when changes are made to those settings. We can display numbers in several other dates and time formats, most of which are not affected by Control Panel settings.

- *If we are using the 1900 date system, dates and times in Excel must be positive values.*
- *When we subtract dates and times, make sure that we build the formula correctly.*
- *If the formula is correct but the result is still a negative value, we can display the value by formatting the cell with a format that is not a date or time format.*

1. *On the **Home** tab, in the **Cells** group, click **Format**, click **Format Cells**, and then click the **Number** tab.*
2. *Select a format that is not a date or time format.*

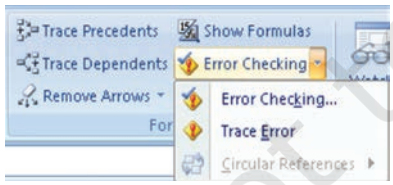

Figure 2.60

Apply a different number format

In some cases, we can change the cell's number format to make the number fit within the existing cell width. For example, we can decrease the number of decimal places after the decimal point.

- **Correct a #DIV/0! Error**

This error occurs when a number is divided by zero (0).

1. Optionally, click the cell that displays the error, click the button that appears, and then click **Show Calculation Steps** if it is appears.

Reasons

a. Entering a formula that contains explicit division by zero (0) — for example, =5/0.

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b. Using the cell reference to a blank cell or to a cell that contains zero as a divisor.

Solutions

- Change the cell reference to another cell.
- Enter a value other than zero in the cell used as a divisor.
- Enter the value **#N/A** into the cell referenced as the divisor, which changes the result of the formula to #N/A from #DIV/0! To denote that the divisor value is not available.
- Prevent the error value from displaying by using the IF worksheet function. For example, if the formula that creates the error is =A5/B5, use =IF (B5=0,"", A5/B5) instead. The two quotation marks represent an empty text string.

- **Correct a #N/A error**

This error occurs when a value is not available to a function or formula.

1. Optionally, click the cell that displays the error, click the button that appears, and then click **Show Calculation Steps** if it appears.

Reasons and Solutions

a. Missing data, and #N/A or NA() has been entered in its place.

b. Giving an inappropriate value for lookup function as an argument such functions may be HLOOKUP, VLOOKUP, MATCH or LOOKUP.

c. Using these lookup functions to locate the value in an unsorted table.

d. Using an argument in the array formula that is not in the same number of rows or columns as the range that contains the array formula.

- **Correct a #NAME? Error**

This error occurs when Excel doesn't recognize text in a formula.

Reasons:

a. The EUROCONVERT function without the Euro Currency Tools add-in being loaded.

Solutions

1. Click the **Microsoft Office Button**, click **Excel Options**, and then click the **Add-ins** category.
2. Select **Excel Add-ins** in the **Manage** list box, and then click **Go**.
3. In the **Add-Ins available** list, select the **Euro Currency Tools** check box, and then click **OK**.

- **Correct #NULL! Error**

This error occurs when we specify an intersection of two areas that do not intersect. The intersection operator is a space between references.

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1. Optionally, click the cell that displays the error, click the button that appears, and then click **Show Calculation Steps** if it appears.
2. Possible causes and solutions.

Incorrect range operator

- To refer to a contiguous range of cells, use a colon (:) to separate the reference to the first cell in the range from the reference to the last cell in the range. For example, SUM (A1:A10) refers to the range from cell A1 to cell A10 inclusive.
- To refer to two areas that don't intersect, use the union operator, the comma (,). For example, if the formula sums two ranges make sure that a comma separates the two ranges (SUM (A1:A10, C1:C10)).

Ranges do not intersect

- If there are no squares at each corner of the **colour-coded border**, then the reference is to a named range.
- If there are squares at each corner of the colour-coded border, then the reference is not to a **named range.**

5. Double-click the cell that contains the formula we want to change. **Excel highlights** each cell or range of cells with a different colour.
6. Do one of the following:

- To move a cell or range reference to a different cell or **range, drag** the **colour-coded** border of the cell or range to the new cell or range.
- To include more or **fewer cells** in a reference, drag a corner of the border.
- In the **formula,** select the reference, and **type** a new one.

7. Press **ENTER.**
8. Do one of the following:

- Select the range of cells that **contains formulas** in which we want to replace references with names.
- Select a single cell to change the references to names in all formulas on the **worksheet.**

9. On the **Formulas** tab, in the **Defined Names** group, click the arrow next to **Define Name**, and then click **Apply Names**.
10. In the **Apply Names** box, click one or more names.

- **Correct#NUM! Error**

This error occurs with invalid numeric values in a formula or function.

1. Optionally, click the cell that displays the error, click the button that appears, and then click **Show Calculation Steps** if it appears.
2. Review the following possible causes and solutions:

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- Using an unacceptable argument in a function that requires a numeric argument.
- Make sure that the arguments (argument: The values that a function uses to perform operations or calculations. The type of argument a function uses is specific to the function. Common arguments that are used within functions include numbers, text, cell references, and names.) used in the function are numbers. For example, even if the value we want to enter is $1,000, enter **1000** in the formula.
- Using a worksheet function that iterates, such as IRR or RATE, and the function cannot find a result.
- Use a different starting value for the worksheet function.
- Change the number of times Microsoft Office Excel iterates formulas.

1. Click the **Microsoft Office Button**, click **Excel Options**, and then click the **Formulas** category.
2. In the **Calculation options** section, select the **Enable iterative calculations** check box.
3. To set the maximum number of times that Excel will recalculate, type the number of iterations in the **Maximum Iterations** box. The higher the number of iterations, the more time that Excel needs to calculate a worksheet.
4. To set the maximum amount of change that we will accept between calculation results, type the amount in the **Maximum Change** box. The smaller the number, the more accurate the result and the more time that Excel needs to calculate a worksheet. Entering a formula that produces a number that is too large or too small to be represented in Excel.

- **Correct a #REF! Error**

This error occurs when a cell reference (cell reference: The set of coordinates that a cell occupies on a worksheet. For example, the reference of the cell that appears at the intersection of column B and row 3 is B3.) is not valid.

1. Optionally, click the cell that displays the error, click the button that appears, and then click **Show Calculation Steps** if it appears.
2. Review the following possible causes and solutions:

- Deleting cells referred to by other formulas, or pasting moved cells over cells referred to by other formulas.
- Change the formulas, or restore the cells on the worksheet by clicking **Undo** immediately after we delete or paste the cells.
- Using an Object Linking and Embedding (OLE) link to a program that is not running.
- Start the program.

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- Linking to a Dynamic Data Exchange (DDE) topic such as "system" that is not available.
- Make sure that we're using the correct DDE topic.
- Running a macro that enters a function that returns #REF!

- **Correct a #VALUE! Error**

This error occurs when the wrong type of argument (argument: The values that a function uses to perform operations or calculations. The type of argument a function uses is specific to the function. Common arguments that are used within functions include numbers, text, cell references, and names.) or operand (operand: Items on either side of an operator in a formula. In Excel, operands can be values, cell references, names, labels, and functions.) is used.

1. Optionally, click the cell that displays the error, click the button that appears, and then click **Show Calculation Steps** if it appears.
2. Review the following possible causes and solutions.

- Entering text when the formula requires a number or a logical value, such as TRUE or FALSE.
- Microsoft Office Excel cannot translate the text into the correct data type. Make sure that the formula or function is correct for the required operand or argument, and that the cells that are referenced by the formula contain valid values. For example, if cell A5 contains a number and cell A6 contains the text "Not available", the formula =A5+A6 will return the error #VALUE!.
- Entering or editing an array formula, and then pressing ENTER.
- Select the cell or range of cells that contains the array formula (array formula: A formula that performs multiple calculations on one or more sets of values, and then returns either a single result or multiple results. Array formulas are enclosed between braces { } and are entered by pressing CTRL+SHIFT+ENTER.), press F2 to edit the formula, and then press CTRL+SHIFT+ENTER.
- Entering a cell reference, a formula, or a function as an array constant.
- Make sure that the array constant (constant: A value that is not calculated and, therefore, does not change. For example, the number 210, and the text "Quarterly Earnings" are constants. An expression, or a value resulting from an expression, is not a constant.) is not a cell reference, formula, or function.
- Supplying a range to an operator or a function that requires a single value, not a range.
- Change the range to a single value.
- Change the range to include either the same row or the same column that contains the formula.

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Summary

- Setting up a spreadsheet can be fairly time consuming, although templates, or sample spreadsheets, are available with most of software packages. The computeried spreadsheet can be formatted with different print layouts. It allows working with rows and columns of numbers and use formula to do "what if" calculations. The spreadsheet gives considerable power and flexibility in entering and editing information, setting up calculations with formula and functions, and printing the results. It has **rows** that are horizontal lines of information that are numbered on the left-hand side of the Excel workbook. **Columns** are vertical lines of information and are identified by letters along the top of the spreadsheet. Rows and columns intersect to form **cells**. A cell is addressed by the column and row position, for example B4 is the intersection of column b and row 4.
- In the earliest spreadsheets, cells were a simple two-dimensional grid. Over time, the model has been expanded to include a third dimension, and in some cases a series of named grids, called **sheets**.
- In any worksheet or spreadsheet a *cell* is the smallest element which may contain a value or a formula or a function or it may simply be left empty. To use formula or function in the cell; usually begin with **=** sign by convention.
- A **cell reference** is the name cell in the spreadsheet. Most cell references indicate another cell in the same spreadsheet, but a cell reference can also refer to a cell in a different sheet within the same spreadsheet or to a value from a remote application. A typical **cell reference** consists the column followed by a row number is called **relative cell reference**. Both column and row number; either part can be relative changes when the cell or formula in it is moved or copied from other cell or absolute (indicated with $ in front of the part concerned of the cell reference). The older "R1C1" reference style consists of the letter R, the row number, the letter C, and the column number; relative row or column numbers are indicated by enclosing the number in square brackets. Most current spreadsheets use the A1 style, some providing the R1C1 style as a compatibility option. When the computer calculates a formula in one cell to update the displayed value of that cell, cell reference(s) in that cell, naming some other cell(s), cause the computer to fetch the value of the named cell(s).
- A reference to a range of cells is typically of the form (A1:A6) which specifies all the cells in the range A1 through to A6. A formula such as "=SUM (A1:A6)" would add all the cells specified and put the result in the cell containing the formula itself.
- A **function** is a special key word which can be entered into a cell in order to perform and process the data which is appended within brackets. There is a function button on the formula toolbar (***fx*);** which function offers assistance

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and useful prompts into a spreadsheet cell. Alternatively we can enter the function directly into the formula bar. A function involves four main issues:

- Name of the function.
- The purpose of the function.
- The function needs what argument(s) in order to carry its assignment.
- The result of the function.

- **Formatting** of spreadsheets makes easier to read and understand the important information (e.g. conditional formatting, number formatting, text and general spreadsheet formatting etc.). A cell or range can optionally be defined to specify how the value is displayed. The default display format is usually set by its initial content if not specifically previously set, so that for example "24/11/1952" or "24 Nov 1952" would default to the cell format of "date". Similarly adding a % sign after a numeric value would tag the cell as a percentage cell format. The cell contents are not changed by this format, only the displayed value.
- To **print** an entire spreadsheet choose **Page Setup** from the **File Menu**, **Choose** the appropriate **options** in terms of horizontal (landscape) or vertical (portrait) printing, Excel prints entire spreadsheet document, if the document is too wide to fit on a page, Excel will print the remaining columns on subsequent pages before continuing to print the remaining rows.
- We can **save our document every 5 minutes**. The first time we save, go to the **File** Menu and pull to **Save**, **make sure the document is in the correct folder** and **on the correct drive**, type the name for what we want to save it as, and click in the **save** box.

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EXERCISE

Q1. Multiple Choice Questions

1. The best way to get started in Excel 2007 is to click the _____.
   a. View toolbar.
   b. Home tab.
   c. Microsoft Office Button.
   d. None of the above.
2. Which key combination collapses the ribbon?
   a. [Ctrl]+[F1]
   b. [Ctrl]+[F3]
   c. [Ctrl]+[F5]
   d. [Ctrl]+[F7]
3. Which view shows margins and the rulers?
   a. Normal
   b. Page Layout
   c. Page Setup
   d. Review
4. As you type a number in a cell, what mode appears in the status bar?
   a. Enter mode
   b. Ready mode
   c. Edit mode
   d. Record mode
5. Where is the address of the active cell displayed?
   a. Row heading
   b. Status bar
   c. Name Box
   d. Formula bar
6. Which command reverses the last action performed in the worksheet?
   a. Cut
   b. Undo

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c. Redo

d. Paste

7. When navigating in a workbook, which command is used to move to the beginning of the current row?

   a. [Ctrl]+[Home]

   b. [Page Up]

   c. [Home]

   d. [Ctrl]+[Backspace]

8. Which key when pressed displays the access keys?

   a. [Alt]

   b. [Ctrl]

   c. [Shift]

   d. [Esc]

9. Which command allows you to reverse an Undo command?

   a. Redo

   b. Repeat

   c. Reset

   d. Reverse

10. Which function results can be displayed in AutoCalculate?

    a. SUM and AVERAGE

    b. MAX and LOOK

    c. LABEL and AVERAGE

    d. MIN and BLANK

11. Which cell alignment is assigned to most values by default?

    a. Right

    b. Left

    c. Centre

    d. Decimal

12. Which function automatically totals a column or row of values?

    a. TOTAL

    b. ADD

    c. SUM

    d. AVG

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13. Which mathematical operator is represented by an asterisk (*)?
    a. Exponentiation
    b. Addition
    c. Subtraction
    d. Multiplication
14. Which step completes an entry and moves the pointer to the cell to the right?
    a. Pressing [Enter]
    b. Pressing [Tab]
    c. Pressing [Shift]+[Tab]
    d. Pressing [Shift]+[Enter]
15. How many blank worksheets are shown when a new workbook is created?
    a. One
    b. Two
    c. Three
    d. Four

Q2. Answer the followings Questions

1. Define spreadsheet and its salient features?
2. Write any five advantages using electronic spreadsheet in place of manual spreadsheet.
3. Define workbook and worksheet. What is the difference between them?
4. Explain active worksheet?
5. Using Fill: Series command in Excel write down the steps to fill data from 120,320.....2300 in Column A.
6. Define Data Range, Name Range and How these are created and selected?
7. Write down the steps for the use of Custom Lists.
8. Explain the purpose of Format, Conditional Formatting and Auto Format.
9. What is Wrap Text feature of Excel, Merging of Cells and what will be the cell address of merged cells?
10. Explain the purpose of using Print Preview?
11. Explain difference between relative reference and absolute reference?
12. Discuss IF function and nested IF functions giving example?
13. Write down examples for any two financial functions you know with their proper syntax.

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14. What is the use of PMT function?
15. How many ways Data Entry is possible in Spread Sheet?
16. Define one-variable Table and Two-variable table. Explain these with examples.
17. Define Pivot Table and explain usage?
18. What are formulas and how they are created?
19. Write down the differences between formula and function?

Q3. Skill Review

A. You had started your own online business to sale and find out the sales for the first week is as follows:

Monday	Rs.120.45
Tuesday	Rs.187.43
Wednesday	Rs.106.87
Thursday	Rs.143.69
Friday	Rs.117.52
Saturday	Rs.87.93
Sunday	Rs.92.12

Use a function to work out how much you earned, on average, each day.

B. Use a Days360 function to work out how many days are left before your next birthday. Instead of typing out the current date in say cell A2, you can use this inbuilt function:

=Now ( )

The Now function doesn't need anything between the round brackets. Once you have today's date, you can enter your birthday in say cell B2.

C. Create an Activity Report (Weekly) for a Sales Representative working in a reputed home appliances manufacturing company. Details recorded should contain Date of Visit, Day of Visit, Name of Shop/Dealer Visited, Address, Phone Number, Name of Product (Dealing), Type of Response (by the Dealer), Demand of Product and Duration Spent (in hrs)..

a. Fill data in Date of Visit, Day of Visit using Fill Series.

b. Name the worksheet created above as Weekly Visit Report.

c. Cerate Product-wise, Dealer-wise Monthly Report which should include Total Hours Spent.

d. Count total number of dealers visited and dealers who gave positive response.

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Create a worksheet to record sales of home appliances sold by M/s Home Maker Ltd. In the following format:

Date of Sales	Name of Customers	Name of Products	Make	Quantity	Sales Amount

The product lists includes Television sets, Refrigerators, Micro wave ovens, Water Coolers, Air Coolers, Geezers and Air conditioners of different Makes (and models). The cost of price of television is ranging from Rs. 10,000 to Rs. 56,000; refrigerator is Rs. 13,000 to Rs. 45,000, micro wave ovens, water coolers, geezers and air coolers are from Rs. 8,000 to Rs. 25,000 and Air Conditioners are from Rs. 18,000 to Rs. 55,000. The shopkeeper sales these products adding 17.25% more on cost price. He provides a discount of 4.35% on total amount if any customer purchases two products on the same date. Enter 30 records of different dates (for a month) and different customers accordingly. Calculate the following:

a. Product wise weekly sales and discount.

b. Calculate the profit of shopkeeper.

c. Product wise total sales of the month and discount offered.

D. Create a worksheet to keep track of revenue collected and expenses done in conducting tour programs at different tourist places during 2004 to 2008. Format the numeric data in currency format, prepare year wise columns for revenue and expenses for each tourist place and calculate the difference. The calculated difference may be negative, the format of negative balance may be red coloured. Use conditional formatting for higher and lower values of revenue and expenses. Align entire text in centre. The font of tourist place is Arial with 14 point while the font of year is Times Roman with 14 points.

(Amount in lacs)

Tourist Place	**2004**		**2005**		**2006**		**2007**		**2008**	
	Rev	**Exp**	**Rev**	**Exp**	**Rev**	**Exp**	**Rev**	**Exp**	**Rev**	**Exp**
Manali	123	55	234	123	345	333	333	365	365	453
Kashmir	234	123	123	55	365	453	345	333	333	365
Shilong	345	333	333	365	123	55	234	123	456	233
Kerala	333	365	365	453	234	123	123	55	345	333

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ANSWERS

1. c	**2.** a	**3.** b	**4.** a	**5.** c	**6.** b
7. c	**8.** a	**9.** a	**10.** a	**11.** b	**12.** c
13. d	**14.** b	**15.** c			

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USE OF SPREADSHEET IN BUSINESS APPLICATIONS

3

Learning Objectives

After studying this chapter you will be able to use spreadsheet for:

- *Computing employee's gross salary. Making necessary deductions to calculate net salary, payroll accounting.*
- *Calculation of deprecation by various methods.*
- *Loan repayment, interest calculation.*

Introduction

In the previous chapter, we have learned about the spreadsheet and its several features that can be used in business applications. In this chapter, we shall discuss the applications of spreadsheet (using Excel) to Payroll Accounting and some other select applications (Asset Management, and Loan Repayment).

3.1 PAYROLL ACCOUNTING

Every employee is paid *salary* on a pre-determined date within the framework of employee contract and related personnel policy in force from time to time in an organisation.

The computation of salary payment is based on the number of days an employee has worked, rate per grade of pay, rate of applied allowances and deductions to be made therefrom.

The preparation of salary bill should provide for the following :

- Maintaining payroll related data such as Employee No., Name, Attendance, Basic Pay, applicable Dearness and other Allowances, deductions to be made.
- Periodic payroll computations: the payroll computation includes the calculation of various earning and deduction heads, which are to be derived from basic values (such as basic salary, number of days under leave without pay (LWP) and unauthorised absence, etc) as per the formulae.

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- Preparation of salary statement and employees salary slips
- Generation of advice to bank: It contains the net salary to be transferred to individual bank account of employees and other salary related statutory payments such as provident fund, tax, etc.

3.1.1 Payroll Components

Every employee is under contractual relationship of service with an organisation, and is paid salary accordingly. The following elements are important for salary computation and its payment:

- **CURRENT PAYROLL PERIOD (MONTH AND YEAR)**
- **EARNINGS**
  - **Basic Pay (BP)** : It is the pay in the pay scale plus Grade Pay, but does not include Special Pay.
  - **Grade Pay (GP)** : It is the pay to be added to the Basic Pay according to the Designation of the employee and applicable pay band or scale of pay.
  - **Dearness Pay (DP)** : It is that portion of Dearness Allowance, which has been declared and deemed to have been merged with the Basic Pay.
  - **Dearness Allowance (DA)** : It is a compensation for erosion in the purchasing power of wage earner due to price rise. It is granted by the Government periodically as a percentage of (Basic Pay + Dearness Pay, if applicable).
  - **House Rent Allowance (HRA)** : It is an amount paid to facilitate employee in acquiring on lease of residential accommodation.
  - **Transport Allowance (TRA)** : It is an amount to facilitate commuting to the the place of work, i.e. Delhi, Bhopal, Haridwar, etc.
  - **Any Other Earning** : It may include any other allowance not included above but declared from time to time, such as Education Allowance, Medical Allowance, Washing Allowance, etc.
- **DEDUCTIONS**
  - **Professional Tax (Applicable in some states) (PT)** : It is a statutory deduction according to the legislature of the State Government.
  - **Provident Fund (PF)** : It is a statutory deduction, as part of social security. It is decided by the Government under the Provident Fund Act and is computed as a percentage of (Basic Pay + Dearness Pay, if applicable).
  - **Tax Deduction at Source (TDS)** : It is a statutory deduction, which is deducted monthly towards Income Tax liability of an employee. It is essentially an apportionment of yearly Income Tax liability over 12 months.

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- **Recovery of Loan Instalment (LOAN)** : Any amount signified by the employee for deduction on account of any loan taken up by him/her.
- **Any Other Deduction** : It may include any other deduction not included above such as Recovery of "Advance against Salary", deductions on account of "Food Grain Advance", "Festival Advance", etc.

3.1.2 Elements Used in Payroll Calculation

Basic Pay Earned (BPE) – Basic Pay Earned of an employee is the Basic Pay calculated with reference to Number of Effective Days present (NOEDP) during the month.

BPE = BP * NOEDP/NODM

Number of Effective Days Present (NOEDP) *– is the Number of Days in a Month Minus Leave without Pay minus Unauthorised Absence, i.e.*

NOEDP = (Number of Days in a Month) *– (Leave without Pay) – (Unauthorised Absence) ; where (Number of Days in a Month) may be denoted by NODM.*

Dearness Allowance (DA) –

*DA = BPE * (Applicable Rate of DA for the Month)*

House Rent Allowance (HRA) –

*HRA = BPE * (Applicable Rate of HRA for the Month)*

Transport Allowance (TRA) –

TRA = (Fixed Amount) or (On Percentage Basis)

Total Earnings (TE) – It is the aggregate of all the above earning elements. Thus,

TE = BPE + DA + HRA + TRA

Provident Fund (PF) : This can be calculated as ***PF = BPE * PF Rate***

Tax Deduction at Source (TDS) : It is usually a fixed amount deducted every month on account of TDS. In the last quarter of a year, the investment details, which are permissible for tax deduction, are received from employees to compute the quarterly and yearly income tax liability more accurately.

Recovery of Loan Instalments (LOAN) : It is a fixed amount to be deducted on account of Loan Installment as part of loan recovery.

Total Deductions (TD) : It is the total of all the above deductions. Thus,

TD = PF + TDS + LOAN

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The Net Salary (NS) is the amount payable to an employee. It is obtained by deducting Total Deductions (TD) from Total Earnings (TE) as given below :

Net Salary (NS) = Total Earnings (TE) – Total Deductions (TD)

3.1.2.1 Template Design

Whenever we have to use a spreadsheet for any computations, the first step is to plan its layout and the template specifying the sequence of various columns, etc. The template also includes identification of cells, which will contain formulae. The advantage of preparing the template is that as a user puts in the values in the spreadsheet, the calculated results are shown correspondingly. A table giving the contents of various columns is a helpful tool to represent the template of a spreadsheet. The following example will explain this process.

Example

There are 14 employees in M/s XYZ Enterprise. The payroll calculations of these employees are given in the spreadsheet shown in Figure 3.3 (a) and Figure 3.3 (b). These figures show the layout of the spreadsheet. In a column, either a value is entered directly or else it is computed using a formula. Such data are given in Figure 3.1. The rules for computing some of the payroll elements used above are given in Figure 3.2.

Different data elements are arranged in the spreadsheet as follows:

- No. of Days in a Month (NODM) is entered in the cell G3
- DA Rate (in %) is entered in the cell G4
- HRA Rates (in %) for Supervisory (Emp Type = "Sup") and Non-supervisory (Emp Type = "Nsup") are entered in the cells G5 and G6, respectively.
- Transport Allowance for Supervisory (Emp Type = "Sup") and Non-supervisory (Emp Type = "Nsup") are entered in the cells G7 and G8, respectively.
- PF Rate (in %) is entered in the cell G9.

Notes

- *In columns I and J, nested-if function (i.e. an "IF" function within another "IF" function) has been used. If function has been introduced in Chapter 2.*
- *The formulae in column-F and column-G use absolute address ($G$3) for cell G3 rather than using the relative address (G3). The absolute address is used for those cells whose reference should not change while the formula is to be copied into other cells. The concept of relative and absolute addressing of cells has been explained in Chapter 2 earlier. Absolute addresses are also used in the formulae used in columns H, I, and J.*

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Column	Column Heading	Abbrev Ref	First line shows Required Formula Second line refers the cell content
A	Employee No	Emp No	Value entered directly
B	Employee Name	Emp Name	Value entered directly
C	Employee Type	Emp Type	Value entered directly
D	Deduction Days	Ded Days	Value entered directly
E	Basic Pay	BP	Value entered directly
F	No. of Effective Days Present	NOEP	= NODM – (Ded Days) = $I$3-D12
G	Basic Pay Earned	BPE	= BP * NOEP/NODM = E12*F12/$I$3
H	Dearness Allowance	DA	= BPE * DA Rate (in %) = G12*$I$4
I	House Rent Allowance	HRA	= If (Emp Typ = "Sup" then 40% of BPE else if (Emp Typ = "Nsup" then 30% of BPE else 0)) = IF(C12="Sup", G12*$I$5, IF(C12 ="Nsup", G12*$I$6,0))
J	Transport Allowance	TRA	= If (Emp Typ = "Sup" then 1000 else if (Emp Typ = "Nsup" then 500 else 0)) = IF(C12="Sup",$I$7,IF(C12 ="Nsup",$I$8,0))
K	Gross Salary	TE	= BPE + DA + HRA + TRA = G12+H12+I12+J12
N	Provident Fund	PF	= BPE * PF Rate (in %) = G12*$I$9
O	Tax Deduction at Source	TDS	Value entered directly
P	Loan Repayment Inst.	LOAN	Value entered directly
Q	Total Deductions	TD	= PF + TDS + LOAN= N12+O12+P12
R	Net Salary	NS	= TE – TD= K12-Q12

Figure 3.1: Spreadsheet Columns and the Cells Content in Spreadsheet shown in Figure 3.3 A

Variable/Type of Employee	Value in % or Fix Value	Remark
Dearness Allowance (DA)	35% of Basic Pay	I4
House Rent Allowance (HRA) –:		
Supervisory Employee (Sup)	40% of Basic Pay	I5
Non-supervisory Employee (Nsup)	30% of Basic Pay	I6
Consultant or Contract Employee	Nil	
Provident Fund (PF)	12% of BP +DA	I9

Figure 3.2: Rules for Computing Some of Payroll Elements

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The following spreadsheet shows columns A to K in Figure 3.3 a; while columns L to P are shown in Figure 3.3 b. For reference, columns A and B are repeated in columns L and M in Figure 3.3 b for reference only.

	A	B	C	D	E	F	G	H	I	J	K
1	M/S X Y Z Enterprises										
2	Payroll for the Month of February, 2009										
3			No. of Days in a Month (NOMD) For February, 2009:						28		
4			DA Rate Applicable for February, 2009:						35%		
5			HRA Rate for Supervisory Staff:						40%		
6			HRA Rate for Non-supervisory Staff:						30%		
7			Transport Allowance for Supervisory Staff						1000		
8			Transport Allowance for Non-supervisory Staff						500		
9			PF Rate:						12%		
10	**Emp. No.**	**Emp Name**	**Emp Type**	**Ded Days**	**Basic Pay**	**No. of Eff. Days**	**Basic Pay Earned**	**DA**	**HRA**	**TRA**	**Total Earnings**
11	101	Sanjay	Sup	1.5	16500	26.5	15616.07	5465.63	6246.43	1000	28328.13
12	341	Nimita	Sup	0.0	34000	28.0	34000.00	11900.00	13600.00	1000	60500.00
13	461	Rohanlal	Sup	0.0	19000	28.0	19000.00	6650.00	7600.00	1000	34250.00
14	561	Aishwarya	Sup	3.0	23000	25.0	20535.71	7187.50	8214.29	1000	36937.50
15	701	Rohitkumar	Sup	1.0	15000	27.0	14464.29	5062.50	5785.71	1000	26312.50
16	941	Kapildev	Sup	0.0	40000	28.0	40000.00	14000.00	16000.00	1000	71000.00
17	1061	Anshuman	Sup	4.0	36000	24.0	30857.14	10800.00	12342.86	1000	55000.00
18	1181	Sachin	Nsup	0.0	9500	28.0	9500.00	3325.00	2850.00	500	16175.00
19	1421	Priyanka	Sup	0.0	23000	28.0	23000.00	8050.00	9200.00	1000	41250.00
20	1541	Nargis	Nsup	0.0	8000	28.0	8000.00	2800.00	2400.00	500	13700.00
21	1661	Ashok	Nsup	0.0	8500	28.0	8500.00	2975.00	2550.00	500	14525.00
22	1781	Rajesh	Nsup	0.5	9000	27.5	8839.29	3093.75	2651.79	500	15084.82
23	2021	Motilal	Cont	0.5	20000	27.5	19642.86	6875.00	0.00	0	26517.86
24	2141	Balraj	Cnst	2.0	25000	26.0	23214.29	8125.00	0.00	0	31339.29
25		**Total**					**275169.64**	**96309.38**	**89441.07**	**10000**	**470920.09**

Figure 3.3 a : Partial Spreadsheet Showing Payroll List upto Gross Salary

	A	B	N	O	P	Q	R
2							
3							
10	**Emp. No.**	**Emp Name**	**PF**	**TDS**	**Loan Instalment**	**Total Deduction**	**Net Salary**
11	101	Sanjay	1873.93	3300	0	5173.93	23154.20
12	341	Nimita	4080.00	6800	2400	13280.00	47220.00
13	461	Rohanla	2280.00	3800	1200	7280.00	26970.00
14	561	Aishwar	2464.29	4600	0	7064.29	29873.21
15	701	Rohitku	1735.71	3000	0	4735.71	21576.79
16	941	Kapilde	4800.00	8000	3000	15800.00	55200.00
17	1061	Anshun	3702.86	7200	2600	13502.86	41497.14
18	1181	Sachin	1140.00	1900	0	3040.00	13135.00
19	1421	Priyank	2760.00	4600	0	7360.00	33890.00
20	1541	Nargis	960.00	1600	0	2560.00	11140.00
21	1661	Ashok	1020.00	1700	1100	3820.00	10705.00
22	1781	Rajesh	1060.71	1800	0	2860.71	12224.11
23	2021	Motilal	2357.14	4000	0	6357.14	20160.71
24	2141	Balraj	2785.71	5000	0	7785.71	23553.57
25		**Total**	**33020.36**	**57300**	**10300**	**100620.36**	**370299.73**

Figure 3.3 (b) : Partial Spreadsheet for calculation of Deductions & Net Salary

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3.2 ASSET ACCOUNTING

In this section, we shall be discussing the computation of amount of depreciation to be charged on assets.

3.2.1 Introduction

Assets are resources of the organisation, which can be classified into fixed and current assets. Fixed assets are long-term assets and provide productive capability to the firm. The examples of fixed assets are land, building, plant & machinery, etc. It includes both tangible and intangible assets. Tangible assets are physical in nature, which have form, shape and size. Intangible assets are resources capable of adding value but do not have a physical dimension such as patents, copyrights, trade mark, etc.

The depreciation on fixed assets is provided to recognise the cost of the asset consumed during an accounting period since the life of such assets extends beyond single accounting year. Usually, depreciation is not provided on free hold land.

Total Amount of Depreciation (Over Life of the Asset) = Acquisition Cost – Salvage Value

Year-to-date depreciation is the accumulated depreciation from the date to which the asset is put to use till the current accounting year.

Year-to-date depreciation is the accumulated depreciation from the date to which the asset is put to use till the current accounting year.

Depreciation is calculated according to the policy of the organisation. There are basically two methods, namely the Straight Line Method (SLM) and the Written Down Value Method (WDV). We had studied depreciation in our previous standard (XIth Standard) in Accountancy Book Part I.

We will recall that asset accounting requires maintenance of asset register, computation of depreciation and preparation of schedule of fixed assets for reporting in the balance sheet as part of the annual accounts. In order to prepare this report the depreciation calculation sheet is also to be prepared.

3.2.2 Computerised Asset Accounting

Assets are classified into the following categories:

- Goodwill
- Land: Free-hold land and Lease-hold land
- Building: Factory building, Office building, and Residential building

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- Plant and Machinery
- Furniture and Fixtures
- Vehicles
- Capital work in progress
- Others

The Companies Act, 1956 in Schedule-14 lists the rate of depreciation to be used for different class of assets under Straight Line Method (SLM) and Written Down Value Method (WDV). The prescribed rates are different under two methods. For reporting purposes, corporate enterprises may use either of the method and applicable rates. Let us now understand the computation of depreciation using the two methods.

3.2.2.1 Straight Line Method (SLM)

The following is the formula for computation of depreciation:

- Acquisition Cost = Purchase Value + Other expenses, such as Transportation Expenses, Installation Expenses and Pre-operating Expenses
- Total Depreciable Amount = Acquisition Cost - Salvage Value

The salvage value of an asset is the value, which is realisable at the end of its useful life.

- $\text{Straight Line Depreciaion} = \dfrac{\text{Total Depreciable Amount}}{\text{Expected Useful Life}}$

- $\text{Rate of Depreciaion} = \dfrac{\text{Straight Line Depreciation}}{\text{Total Depreciable Amount}} \times 100$

Example

The depreciation calculation (using SLM) is done using the Excel spreadsheet, which is shown in Fig. 3.5 a and Fig. 3.5 b in two parts due to the limitation of the page width. In each of the spreadsheet column, either a value is entered directly or else it is computed using a formula. Such data are given in Figure 3.4.

Different data elements are arranged in the spreadsheet as follows:

- Year Beginning Date is entered in cell-C3
- Year End Date is entered in cell-F3
- First-Half Year End Date is entered in cell-E3

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Column	Column Heading	Abbrev Ref	First line shows Required Formula Second line refers the cell content
A	Asset Name	Asset Name	Value entered directly
B	Date of Purchase	Pur. Date	Value entered directly
C	Date of Installation	Inst. Date	Value entered directly
D	Cost of Purchase	Pur. Cost	Value entered directly
E	Installation Expenses	Inst. Exp.	Value entered directly
F	Pre-operating Expenses	Pre-op Exp	Value entered directly
G	Cost to Use	Cost to Use	= (Cost of Purchase) + (Installation Expenses) + (Pre-operating Expenses) = D5+E5+F5
H	Salvage Value	Salvage Val	Value entered directly
I	Life of Asset in Years	Life in Yrs	Value entered directly
K	Depreciation Amount	Depr.	=SLN(G5,H11,I11)

Figure 3.4: Column Items and their contents referred to in the Spreadsheet

The depreciation is computed by straightline method using the built-in spreadsheet function SLN in column-K. The spreadsheets are shown in Figure 3.5(a) and Figure 3.5(b).

	A	B	C	D	E	F	G
1	M/s GUNGUN Ltd.						
2	Calculation of Depreciation for the Financial Year 2008-09 (SLM Method)						
3		Year-Beg-Dt	01-Apr-08		Year-End Dt	31-Mar-09	
4	Asset Name	Purchase Date	Installation Date	Purchase Cost	Installation Expenses	Pre-Operation Expenses	Cost to Use
5	CNC Machine	11-Jul-08	17-Jul-08	877000	11000	3000	891000
6	Packing Machine	03-May-06	07-May-06	123000	8000	2500	133500

Figure 3.5(a) : Partial Spreadsheet Columns for Calculation of Depreiation by SL Method

	H	I	J	K
7	M/s GUNGUN Ltd.			
8	Calculation of Depreciation for the Financial Year 2008-09 (SLM Method)			
9	Total No of Days	365		
10	Salvage Value	Life in Years	Allowed Depreciation	Depreciation
11	45000	7	100%	120857.14
12	17000	7	100%	16642.86

Figure 3.5(b) : Partial Spreadsheet Columns for Calculation of Depreciation by SL Method

The above-mentioned computations and spreadsheets (shown in two parts due to the constraint in the page width) give an idea of the process of depreciation calculation using SLM function. The spreadsheet

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calculation includes "Salvage Value", "Life in Years", "Allowed Depreciation", and "Depreciation" Columns with previous spreadsheet "Asset Name" Column for Reference.

3.2.2.2 Written Down Value (WDV) Method

Written Down Value (WDV) method uses the current book value as the base for computing the depreciation for the next period. It is also called Declining Balance (DB) method and uses the Excel function DB to compute the depreciation. The parameters of the function DB are as follows (Figure 3.6):

Column	*Parameter*	*Explanation*
G	Cost	Initial cost of the asset
H	Salvage	Salvage value
I	Life	Life (in years) of the asset
J	Period	Period (in years) for which the depreciation is calculated
K	Month	No. of months in the 1st year

Figure 3.6: Column Items and their contents referred in the Spreadsheet

In a column, either a value is entered directly or else it is computed using a formula. Such data are given in Figure 3.7.

Different data elements are arranged in the spreadsheet as follows:

- Year Beginning Date is entered in cell-C3
- Year End Date is entered in cell-F3
- First-Half Year End Date is entered in cell-I3

Column	*Column Heading*	*Abbre. Ref*	*First line shows Required Formula Second line refers the cell content*
A	Asset Name	Asset Name	Value entered directly
B	Date of Purchase	Pur. Date	Value entered directly
C	Date of Instalation	Inst. Date	Value entered directly
D	Cost of Purchase	Pur. Cost	Value entered directly
E	Instalation Expenses	Inst. Exp.	Value entered directly
F	Pre-operating Expenses	Pre-op Exp	Value entered directly
G	Cost to Use	Cost to Use	= (Cost of Purchase) + (Instalation Expenses) + (Pre-operating Expenses) = D5+E5+F5
H	Salvage Value	Salvage Val	Value entered directly

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Column	Column Heading	Abbre. Ref	First line shows Required Formula Second line refers the cell content
I	Life of Asset in Years	Life in Yrs	Value entered directly
J	Period (in Years) for which Depr. is to be computed	Period	If (Instalation of asset was done after March) then take (Current Year) – (Year of Instalation) else take one addl. Year. = IF (MONTH(C5) > 3,(YEAR($F$3)-YEAR(C5)),(YEAR($F$3)-YEAR(C5))+1)
K	Months in 1st Year (i.e. the year of installation)	Months in 1st Yr	No. of months between (Yr-End-Dt in 1st Yr) & (Inst.Date) = ROUND((L5-C5)/30,0)
L	Year-end Date in 1st Year (Reqd. to compute column-K)	Yr-End-Dt in 1st Yr	If (Inst. Date) was Between Jan and Mar, Take it as 31st Mar of (Year of Inst. Date) Else Take it as Next Year. = IF(AND(MONTH(C5)>0,MONTH(C5) <4), DATE(YEAR(C5),3,31), DATE(YEAR(C5)+1,3,31))
M	Depreciation	Depr.	Parameters of DB function as explained above = DB(G5,H5,I5,J5,K5)

Figure 3.7: Column Items and their Contents used in Spreadsheet (in Figure 3.8 a and b)

The spreadsheet is divided in two parts; first part shows columns A to G in Figure 3.8 a; while second part shows columns H to M are shown in Figure 3.8 b. The "Asset Name" is repeated in both the figures:

	A	H	I	J	K	L	M
1	M/s GUNGUN Ltd.						
2	Calculation of Depreciation for the Financial Year 2008-09 (WDV Method)						
3		Year-Beg-Dt	01-Apr-08		Year-End	31-Mar-09	
4	Asset Name	Purchase Date	Installation Date	Purchase Cost	Installation Expenses	Pre-Operation Expenses	Cost to Use
5	CNC Machine	11-Jul-08	17-Jul-08	877000	11000	3000	891000
6	Packing Machine	03-May-06	07-May-06	123000	8000	2500	133500

Figure 3.8 a : Partial Spreadsheet Columns for Calculation of Depreciation by WDV Method

	A	B	C	D	E	F	G
1	M/s GUNGUN Ltd.						
2	Calculation of Depreciation for the Financial Year 2008-09 (WDV Method)						
10	Asset Name	Salvage Value	Life in Years	Period	Months in 1st Yr	Yr-End-Dt in 1st Yr	Depreciation
11	CNC Machine	45000	7	1	9	31-Mar-09	231882.75
12	Packing Machine	17000	7	3	11	31-Mar-07	19433.37

Figure 3.8 b : Partial Spreadsheet Columns for Calculation of Depreciation by WDV Method

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The above-mentioned computations and spreadsheets (shown in two parts due to the constraint in the page width) give an idea of the process of depreciation calculation using WDV function. The spreadsheet calculation includes "Salvage Value", "Life in Years", "Allowed Depreciation", and "Depreciation" Columns with previous spreadsheet "Asset Name" Column for Reference.

3.2.2.3 Schedule Forming Part of the Balance Sheet

The details of various columns are given in the following table:

Column	*Column Heading*	*Under*	*First line shows Required Formula Second line refers the cell content*
A	Description		Value entered directly
B	As at Apr 1, 2008	Gross Block	Value entered directly
C	Additions/Adjustments	Gross Block	Value entered directly
D	Deductions/Adjustments	Gross Block	Value entered directly
E	As at Mar 31, 2009	Gross Block	= Op. Bal + Additions/Adjustments = B8+C8-D8
F	As at Apr 1, 2008	Depreciation	Value entered directly
G	Additions	Depreciation	Value Transferred from Depreciation Computation Spreadsheet
H	Deductions	Depreciation	Value entered directly
I	As at Mar 31, 2009	Depreciation	= Op. Bal + Additions – Deductions = F8+G8-H8
J	As at Apr 1, 2008	Net Block	= Gross Block – Depreciation as on Apr 1, 2008 = B7–F7
K	As at Mar 31, 2009	Net Block	= Gross Block – Depreciation as on Mar 31, 2009 = E7-I7

Figure 3.9: Column Items and their Contents used in Spreadsheet (in Figure 3.10 a and b)

The spreadsheet is divided in two parts; first part shows columns A to E in Figure 3.10 a; while second part shows columns F to K are shown in Figure 3.10 b. The "Asset Name" is repeated in both the figures:

	A	B	C	D	E
1	M/s GUNGUN Ltd.				
2	Schedule Forming Part of the Balance Sheet as on March 31, 2009				
3	Fixed Assets				Schedule "E"
4	Description	Gross Block			
5		As on Apr 1, 2008	Additions/ Adjustments	Deductions / Adjustments	As on Mar 31, 2009
6	Building	12081.00	0.00	0.00	12081.00
7	Plant & Machinery	13942.00	2765.00	14.00	16693.00
8	Office & Other Equipment	2894.00	616.00	3.00	3507.00
9	Furniture & Fixtures	1681.00	777.00	0.00	2458.00
10	Vehicles	927.00	483.00	24.00	1386.00

Figure 3.10 a: Spreadsheet Containing Fixed Asset Schedule Showing Gross Block

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	A	F	G	H	I	J	K
12	M/s GUNGUN Ltd.						
13	Schedule Forming Part of the Balance Sheet as on March 31, 2009						
14	Fixed Assets						Schedule "E"
15	Description	Depreciation				Net Block	
16		As on Apr 1, 2008	Additions	Deductions	As on Mar 31, 2009	As on Apr 1, 2008	As on Mar 31, 2009
17	Building	1812.15	604.05	0.00	2416.20	10268.85	9664.80
18	Plant & Machinery	4182.60	166.93	0.00	4349.53	9759.40	12343.47
19	Office & Other Equipment	868.20	350.70	0.00	1218.90	2025.80	2288.10
20	Furniture & Fixtures	504.30	245.80	0.00	750.10	1176.70	1707.90
21	Vehicles	370.80	277.20	0.00	648.00	556.20	738.00

Figure 3.10 b: Spreadsheet Containing Fixed Asset Schedule Showing Depreciation and Net Block

The above-mentioned computations and spreadsheets (shown in two parts due to the constraint in the page width) give an idea of the process of Schedule Forming Part of the balance sheet.

3.3 LOAN REPAYMENT SCHEDULE

3.3.1 Loan

Loan is a sum of borrowed money (termed as principal amount) for a specified period at a pre-specified rate of interest. The loan is repaid through a number of periodic (usually monthly) repayment instalments over the loan repayment period.

3.3.1.1 Calculating Interest and Repayments of Loan

Computation of repayment installments is an iterative process. The Excel's built-in function, PMT can be used to compute monthly instalments of repayment of loan. The parameters of the function PMT are as follows:

Parameter	*Explanation*
Rate	Interest rate per period for the loan
Nper	Total number of payments for the loan. Its unit (e.g. year) should match with the unit of the interest rate.
Pv	Present value, i.e. the loan amount
Fv	Future value, which is taken as 0, is the balance at the end of the loan period
Type	Whether payment is made at the beginning (value=1) or at the end (value=0) of the period

Figure 3.11 Explanation of Parameters of Excel's PMT Function

The layout of the spreadsheet for loan repayment calculation is given in Figure 3.13. In each column of the spreadsheet, either a value is entered directly or else it is computed using a formula. Such data are given in Figure 3.12.

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Column	Column Heading	First line shows Required Formula Second line refers the cell content
A	Loan Amt.	Value entered directly
B	Loan Disbursement Date.	Value entered directly
C	Period of Loan (in Yrs).	Value entered directly
D	Rate of Interest.	Value entered directly
E	Future Value.	Value entered directly
F	Yearly Installment Amt.	= PMT(D6,C6,-A6,0,1)
G	Monthly Installment Amt.	=F6/12

Figure 3.12: Column Items and their Contents in Spreadsheet

Why is FV taken as zero (0) in the above calculations?

At the end of the loan period, the (balance) amount payable will be zero assuming that the repayments are made on regular basis. Therefore, the future value (FV) is taken as zero.

The following two examples are considered for computation of repayment schedule in the spreadsheet shown in Figure 3.13.

Example 1

A bank has given loan of Rs. 1, 00,000 to a customer for the purchase of a Plasma TV on April 1, 2007 @ 10% interest rate for a period of two years. The loan is to be repaid in 24 monthly instalments.

Example 2

Ajay has been sanctioned the bank loan of Rs. 2, 50,000 for the purchase of a car on May 15, 2008. The loan carries the rate of interest @ 11% and it is to be repaid in 36 monthly instalments.

	A	B	C	D	E	F	G
1	Happy Banking Corp.						
2	Loan Repayment Schedule						
3							
4	Loan Amt	Loan Disbursement Date	Period of Loan (in Yrs)	Rate of Interest	Future Value	Yearly Instalment Amount	Monthly Instalment
5	100000	01-Apr-07	2	10%	0.00	52380.95	4365.08
6	250000	15-May-08	3	11%	0.00	92165.11	7680.43

Figure 3.13: Spreadsheet Containing Loan Repayment Schedule

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Summary

- MS-Excel is an easy and useful tool for various calculations carried out on spreadsheets. In this chapter, three examples have been taken to illustrate the ease and utility of spreadsheets. These examples are Payroll Calculation, Fixed Asset Accounting, and Loan Repayment Schedule.
- The first step in using spreadsheet is to list out the elements of the application. For each element, it is determined whether a direct value is to be entered or else it is to be computed using a formula.
- Excel has a rich library of various built-in functions including financial functions, which can be directly used to carry out various (otherwise complex) calculations. A formula may use one or more such functions.
- In these applications, some of the formulae use absolute address. The absolute address is used for those cells whose content should not change while the formula containing such cells is copied to other cells.
- If-function is also used in these applications. If-function is used to implement different action corresponding to different conditions.
- The Excel functions SLN and DB are used for computation of depreciation using Straight Line Method (SLM) and Written Down Value Method (WDVM), respectively. WDV Method is also termed as declining balance (DB) method.
- The function PMT is used to compute the loan repayment schedule.

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EXERCISE

Q1. Multiple Choice Questions

1. Which of the following options in a financial function indicates the interest for a period?
   a. FV.
   b. PV.
   c. Nper.
   d. Rate.

2. Which of the following arguments in a financial function represents the total number of payments?
   a. FV.
   b. PV.
   c. Nper.
   d. Rate.

3. What category of functions is used in this formula:
=PMT(C10/12,C8,C9,1)
   a. Logical.
   b. Financial.
   c. Payment.
   d. Statistical.

4. When Extend Selection is active, what is the keyboard shortcut for selecting all data up to and including the last row?
   a. [Ctrl]+[Down Arrow].
   b. [Ctrl]+[Home].
   c. [Ctrl]+[Shift].
   d. [Ctrl]+[Up Arrow].

5. Which formula would result in TRUE if C4 is less than 10 and D4 is less than 100?
   a. =AND(C4>10, D4>10).
   b. =AND(C4>10, C4<100).
   c. =AND(C4>10, D4<10).
   d. =AND(C4<10, D4<100).

6. Which of these is not an argument of the IF function?
   a. Logical_test.
   b. Value_if_false.
   c. Value_when_false.
   d. Value_if_true.

7. In what cell is the Rate for PMT function where = PMT (C8, C9, C10, C11, C12)?
   a. C8.
   b. C9.
   c. C10.
   d. C12.

Q2. Answer the following Questions

1. What is the meaning of PV?
2. State the usage of FV?
3. What is the purpose of DB function?

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4. If an investment of Rs. 1,000 is made today, ascertain its Future Value (FV) after 2 years if the rate of interest is taken as 10%?

5. If a sum of Rs. 1000 is likely to be earned after 3 years, calculate its present value (PV).

6. What is the difference between WDV method and SLM method of depreciation?

7. Describe the two basic methods of depreciation. What functions of Excel are used for computation of depreciation?

8. Explain the importance of absolute and relative addresses. What is the basis of using relative address and absolute address?

SKILL REVIEW

1. In columns F, G, H, I, J, and N of the Payroll spreadsheet shown in Figure 3.3 (a) and Figure 3.3 (b) the absolute addresses are used. What will happen if relative addresses are used instead of absolute addresses?

2. In columns g of the spreadsheet shown in Figure 3.8 b for the depreciation calculation using WDV method (i.e. using DB function), the absolute addresses of cell F3 is used. Taking relative address of F3 instead of its absolute address will lead to wrong result when the formula is copied. Explain the reason and write down the values copied along with the correct values, which should have been copied.

3. Prepare attendance record in a spreadsheet for a class of 25 student's month wise for 10 months. Calculate the percentage of presence for each student every month. Prepare a month wise summary of every student and calculate the overall percentage of presence.

4. Use spreadsheet to prepare class timetable. It should compute and check the total number of lectures, tutorials and lab practical sessions allocated for each subject. It should also compute and check the total number of hours of engagement for each teacher.

5. Prepare the worksheets yourself for examples used in sections 3.1, 3.2, 3.3 and 3.4 respectively. Add two new more records in each worksheet (with your own assumed values) and verify whether the computations are correct.

6. Create a worksheet to keep a record of employees of M/s Opportunities Company. Employee details should include Name of Employee, Designation and Basic Salary. Enter 50 records. Calculate Dearness Allowance (DA) as 37.5% of Basic Salary, House Rent Allowance (HRA) 22.5% of Basic Salary, Provident Fund (PF) as 12% of Basic Salary, Gross Salary as Basic Salary + DA+HRA. The Income Tax (IT) as 20% of Gross Salary and Net Salary is Gross Salary – (PF+IT) for each employee. Calculate also Total Salary, Average Salary, Maximum Salary and Minimum Salary paid by the company.

7. In Section-3.3, the loan instalment is computed for a given amount of loan repayable over a specified period at a specified rate of interest. Modify this exercise by fixing the loan instalment amount and compute the loan period using the PMT function.

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ANSWERS

1. b **2.** c **3.** b **4.** c **5.** d **6.** c **7.** a

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GRAPHS AND CHARTS FOR BUSINESS DATA

4

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Learning Objectives

After studying this chapter, you will be able to:

- *represent data in graphical form in charts & diagrams through Excel.*
- *use accounting data for graphical representation.*

Introduction

In the previous chapter, you were introduced to the basic features of spreadsheet and use of spreadsheet in accounting. Quite often, we have to present the data for communication of the accounting information. If mass of data is presented in the raw form, it may not be easily understandable. It is rightly said, "A picture is worth more than thousand words". This chapter seeks to explain the method of preparing graphs, charts and diagrams showing the data through the use of Excel as a tool.

4.1 GRAPHS AND CHARTS

A graph is a pictorial representation of data, which has at least 2 dimensional relationship. Therefore, a graph has at least two axes, X and Y. X-axis is usually horizontal while Y-axis is vertical. A graph may either be a singleline graph or a multiple-line graph. For ease and enhancing of clarity, different types of lines and different shades of Colours can be used for preparing a multiple-line graph.

A pie chart represents multiple sub-groups of single variable. A bar diagram depicts two or more variables.

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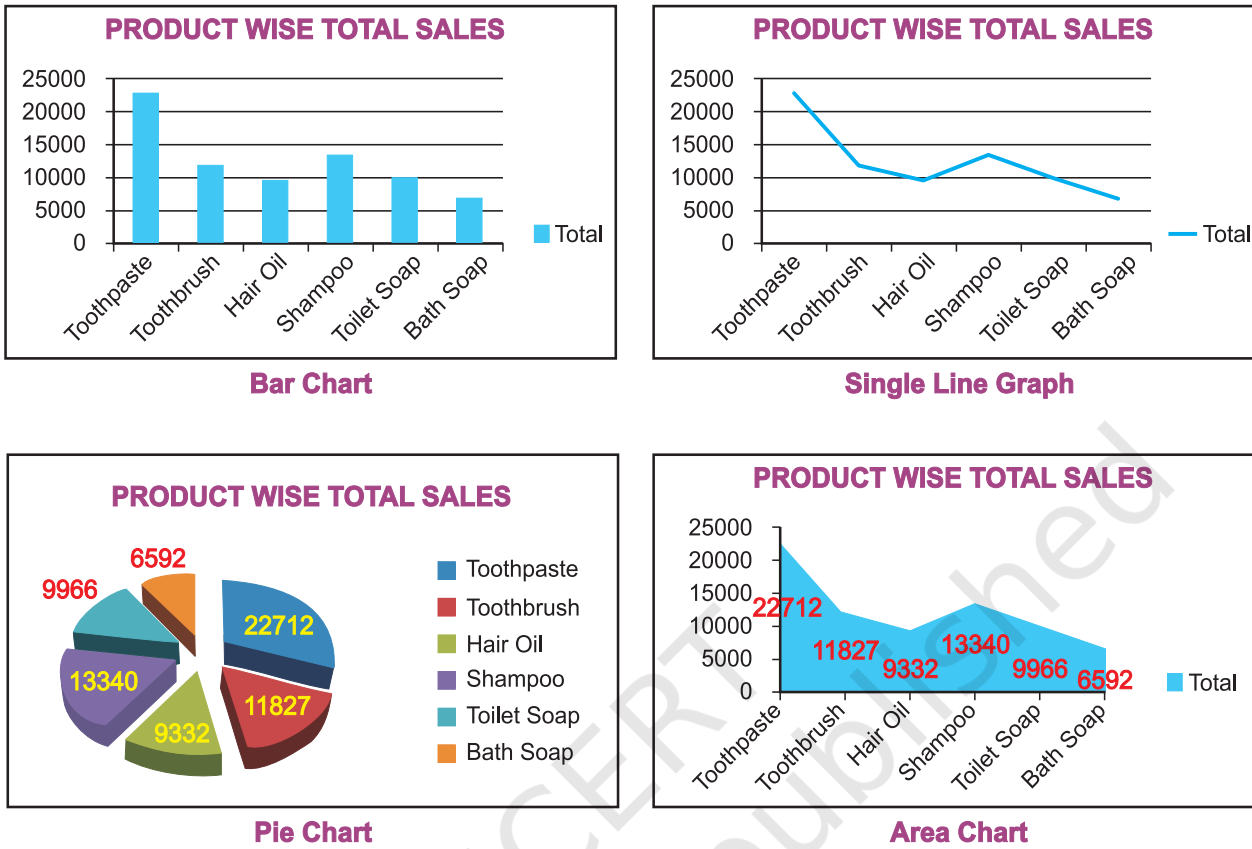

Figure 4.1: Various types of graph and charts

Figure 4.1 shows different types of graphs and charts which can be prepared with the help of the commands or standard tools given in toolbar.

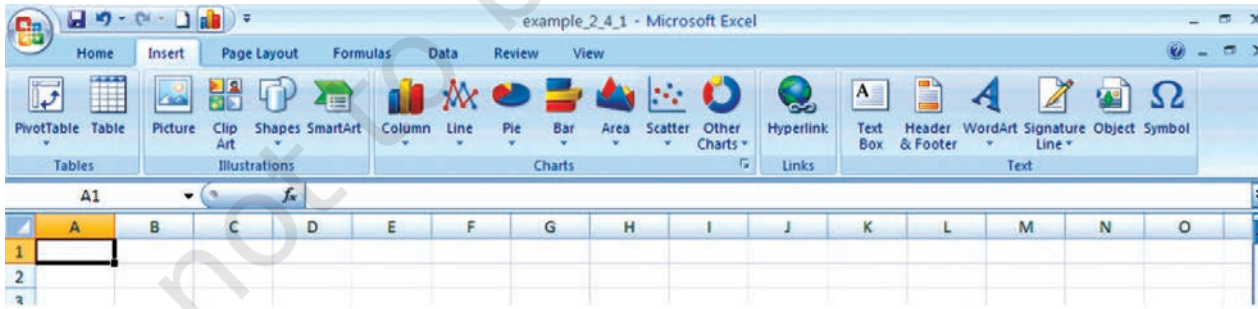

Figure 4.2: Tools for various types of graphs

Using the MS Excel 2007 we can create a basic chart by clicking the chart type that we want on the Microsoft Office Fluent user interface Ribbon, as shown in Figure 4.2. Remember these following steps which are already explained in previous chapter.

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1. On the screen of the computer mouse click on **Start** Icon
2. On clicking of **Start** symbol we will get **Programs** option; which will provide us access to a list of programs installed on the computer.
3. On selecting MS Excel 2007 program it will provide a blank workbook with a Ribbon displayed at the top as shown in Figure 4.2.
4. Click on Insert tab to get tools for chart as shown in Figure 4.3.

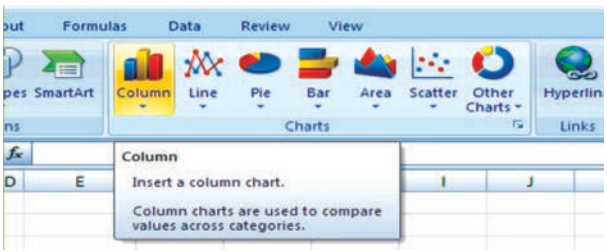
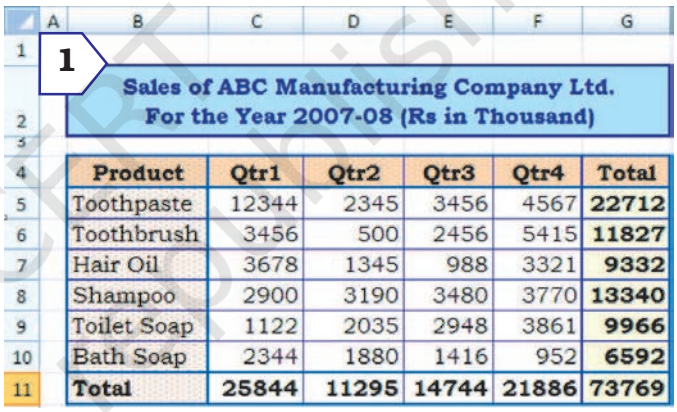


Figure 4.3 Tools for various types of graphs

We will learn how to draw graphs, charts and diagrams for the following worksheet data see Figure 4.4.

Using the following two steps we can create any type of chart / graph that displays the details that we want.

4.2 BASICS STEPS FOR GRAPHS/CHARTS/ DIAGRAMS USING EXCEL



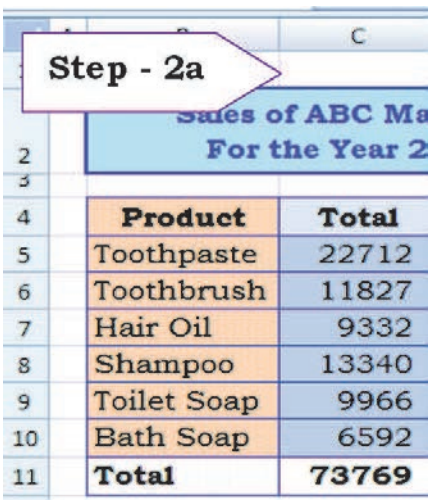
Product	Qtr1	Qtr2	Qtr3	Qtr4	Total
Toothpaste	12344	2345	3456	4567	22712
Toothbrush	3456	500	2456	5415	11827
Hair Oil	3678	1345	988	3321	9332
Shampoo	2900	3190	3480	3770	13340
Toilet Soap	1122	2035	2948	3861	9966
Bath Soap	2344	1880	1416	952	6592
Total	**25844**	**11295**	**14744**	**21886**	**73769**

Figure 4.4 Quarterly Sales of Product

Step - 1

To create a chart in Excel; we will enter sales related data for each quarter sales (namely QTR1 to QTR4) of the year 2007-08 for six different products manufactured by ABC Manufacturing Company Ltd. (as given in Figure 4.4) The row totals (row number 11) gives the quarter wise total sales of products and the column totals (column number G) gives product wise total sales. The cell G11 gives over all total sales of the products for the year are entered in a worksheet.

Step - 2a



Product	Total
Toothpaste	22712
Toothbrush	11827
Hair Oil	9332
Shampoo	13340
Toilet Soap	9966
Bath Soap	6592
Total	**73769**

In this step we will select to plot the data **Product wise Total sales** (see in Figure 4.4 and independently shown as Step 2a) into a chart by selecting the chart type that we want to use from the Ribbon. The steps are also described earlier in section 4.1 (use **Insert** tab and click on **Charts** group). Let us draw the Bar Chart for the data of step - 2a.

Step - 2b

To draw a chart/graph for the given data by Excel the above steps are essential and important. From the tab on the ribbon we can see that Excel supports many

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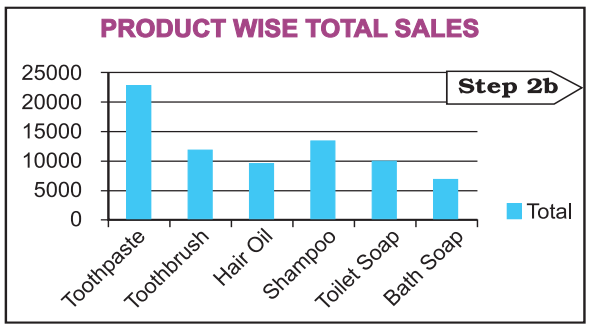

types of charts to display data in meaningful ways.

Let us prepare a new chart from the same worksheet to display total sales for each quarter. The data in the worksheet is to be reorganised for the purpose of chart preparation and as mentioned above, graph/chart will be prepared in similar two steps as described above (Figure 4.5).

Period	Total Sales
Qtr1	25844
Qtr2	11295
Qtr3	14744
Qtr4	21886
Total	**73769**

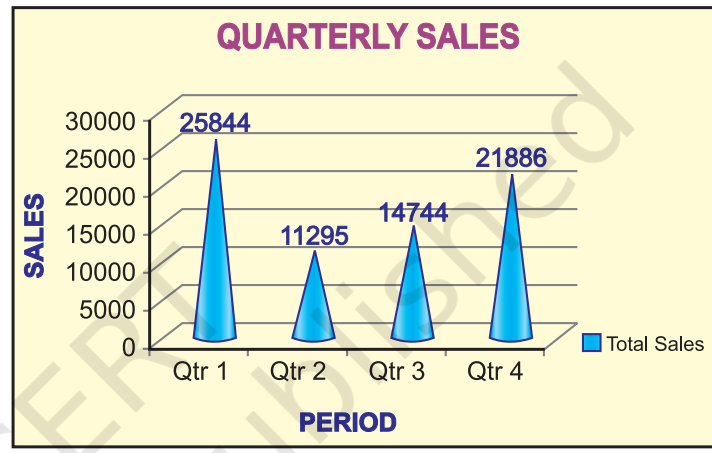

Figure 4.5

To create a chart or to change an existing chart, we select variety of chart types (such as a column chart or pie chart) and their sub-types (such as a stacked column chart or a pie in 3-D chart) from the ribbon. We can also create a combination of chart by using more than one chart type in any chart. This could be possible once we understand the elements of the chart and the formatting of the chart.

4.2.1 Elements of a Chart/Graph

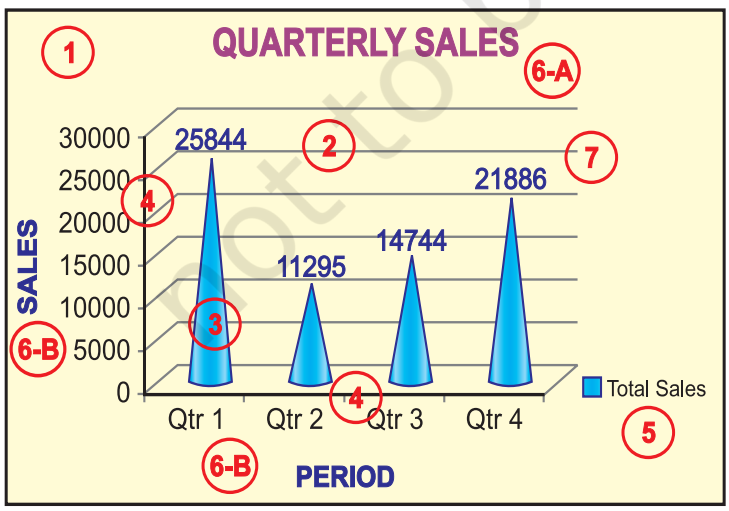

Figure 4.6

A chart/graph are a pictorial presentation of data. To understand and explain the chart/graph we will learn all basic elements of the chart. These chart/graph elements are given in Figures 4.6 and 4.7.

1. The chart area: The entire chart including all elements.

2. The plot area: In a 2-D chart, the area is bounded by the X and Y axes. In a 3-D chart, the area is bounded by the three (X, Y and Z) axes.

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3. The data points: Individual values plotted in a chart and represented by bars, columns, lines, pie or various other shapes are called **data markers**. Data markers of the same colour constitute a **data series**. The data series are related **data points** that are plotted in the chart/ graph. Each data series in a chart is shown in a unique colour or pattern or both. Its identification is given by the legend. There may be more than one data series in a chart/graph.

4. The horizontal (category) and vertical (value) axis: The x-axis is usually the horizontal line which contains categories (independent values or categories) and y-axis is usually the verticals which contains data (dependent values).

5. The legend: It is an identifier of a piece of information shown in the chart/graph. The legends are assigned to the data series or different categories in a chart (Figure 4.7).

6. A chart and axes titles: Descriptive text for chart title (6-A) and axis title (6-B) as shown in Figure 4.6.

7. A data label: This provides additional information about a data marker to identify the details of data point in a data series.

Some of the elements are displayed by default when we prepare the chart/graph; others can be added as needed. It is also possible to change the format or display of the chart/graph as desired.

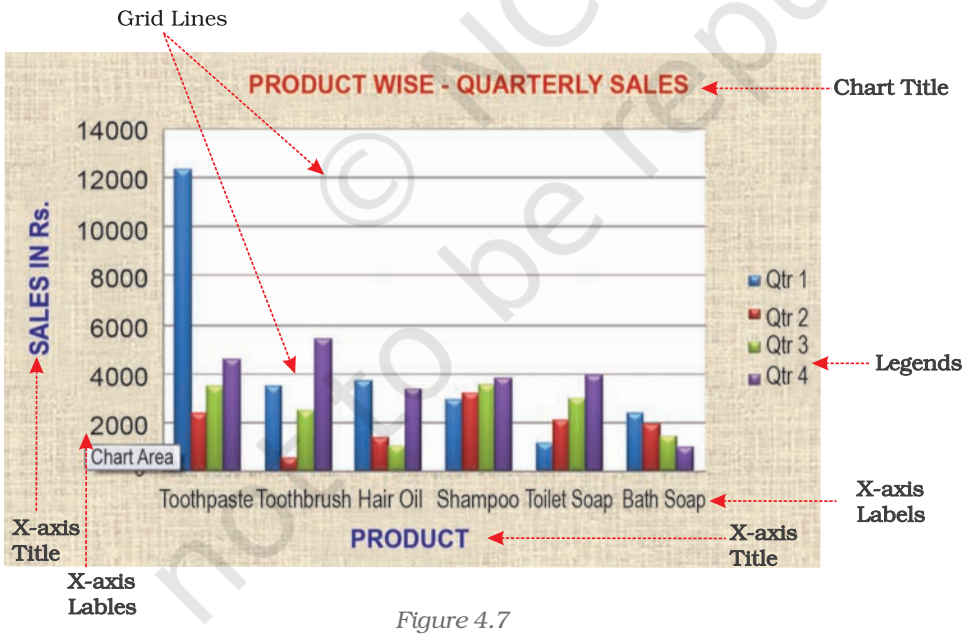

Figure 4.7

4.2.2 Formatting of Chart

4.2.2.1 Formatting the Chart (using design option)

As referred in earlier section 4.2.1 above; in this section we will learn how the elements of a chart such as plot area, X-axis, Y-axis, data,

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titles, labels, legends and gridline as shown in Figure 4.7 can be formatted and edited as per the requirement. Click anywhere in the chart. This will display the **Chart Tools**, adding the **Design**, **Layout**, and **Format** tabs (Figure 4.8a).

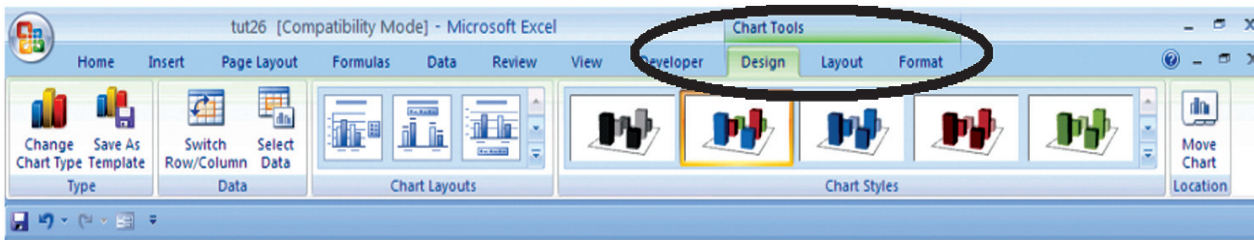

Figure 4.8 (a)

Using **Design** option we can change the look of a chart. In the **Design** dialog box, we can click to change chart type, chart layouts and chart styles. One of the options provide for 2-d chart to swap the column data to row data and row data to column data. The steps are as follows:

In a chart (Figure 4.7) click the chart element to change, or do the following to select the chart element from a list of chart elements:

Figure 4.8 (b)

1. Click anywhere in the chart (Figure 4.7). This will display the **Chart Tools**, adding the **Design**, **Layout**, and **Format** tabs.
2. On the **Design** tab, in the **Data** group, click the arrow at the **Switch Row/Column** box.
3. This will swap the chart/ graph from X-axis (Product) to X-axis (Quarterly)(Figure 4.8(b).

4.2.2.2 Changing the format of a selected chart element

In the same chart, click the chart element to change, or do the following to select the chart element from a list of chart elements:

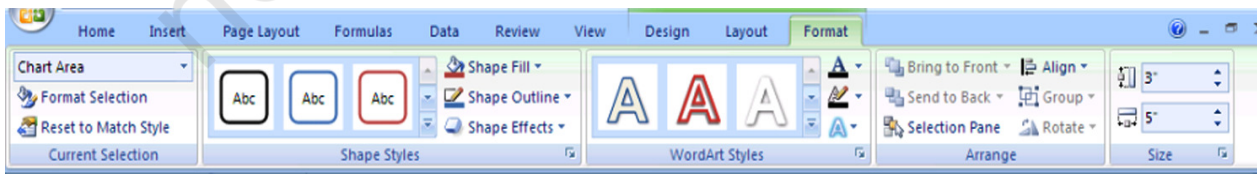

Figure 4.8 (c)

1. Click anywhere in the chart. This will display the **Chart Tools**, adding the **Design**, **Layout**, and **Format** tabs (Figure 4.8(c).

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2. On the **Format** tab, in the **Current Selection** group, click the arrow next to the **Chart Elements** box, and then select the chart element which requires to format.
3. On the **Format** tab, in the **Current Selection** group, click the **Format Selection** (Figure 4.8(d)).
4. In the **Format <Chart Element>** dialog box, click a category, and then select the formatting options.

Figure 4.8 (d)

Changing the shape style

1. On the **Format** tab, in the **Shape Styles** group, do one of the following:
   - To see all available shape styles, click the **More** button.
   - To apply a pre- defined shape style, in the shape style box, click the style that we want.

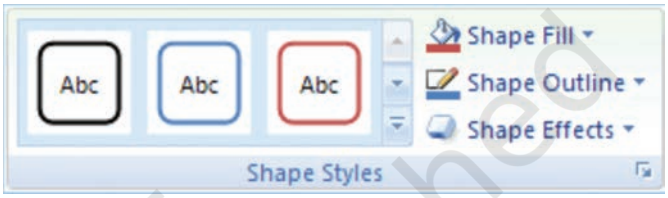

Figure 4.8 (e)

   - To apply a different shape fill, click **Shape Fill**, and then do one of the following: (Figure 4.8(e))
     - To use a different fill Colour, under **Theme Colours** or **Standard Colours**, left click the select Colour.
     - To remove the Colour from the selected chart element, click **No Fill**.
     - To use a fill Colour that is not available under **Theme Colours** or **Standard Colours** click **More Fill Colours**. In the **Colours** dialog box, specify the Colour that we want to use on the **Standard** or **Custom** tab, and then click **OK**. Custom fill Colours are added under **Recent Colours** can also be used.
     - To fill the shape with a picture, click **Picture**. In the **Insert Picture** dialog box, click the picture to use, and then click **Insert**.
     - To use a gradient effect for the selected fill Colour, click **Gradient**, and then under **Variations**, click the gradient style to be used. For additional gradient styles, click **More Gradients**, and then in the **Fill** category, click the gradient options that to use.
     - To use a texture fill, click **Texture**, and then click the texture to use.

Changing the Shape Outline

- To apply a different shape outline, click **Shape Outline**, and then do one of the following:
  - To use a different outline Colour, under **Theme Colours** or **Standard Colours**, click the Colour to use.

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- To remove the outline Colour from the selected chart element, click **No Outline**. If the selected element is a line, the line will no longer be visible on the chart.
- To use an outline Colour that is not available under **Theme Colours** or **Standard Colours** click **More Outline Colours**. In the **Colours** dialog box, specify the Colour that to use on the **Standard** or **Custom** tab, and then click **OK**. Custom outline Colours are added under **Recent Colours** can be used again.
- To change the **weight** (thickness) of a line or border, click **Weight** option, and then select the line that we wish to use. For additional line style or border style options, click on **More Lines**, and then click the line style or border style options.
- To use broken line (dash–dash) or border, click **Dashes**, and then click the dash type to use. For additional dash-type options, click on **More Lines**, and then click the selected dash.
- To add arrows to lines, click **Arrows**, and then click the arrow style for borders cannot be used. For additional arrow style or border style options, click **More Arrows**, and then click the arrow setting.

To apply a different shape effect, click **Shape Effects**, click an chosen effect, and then select the type of effect.

The **shape effects** depend on the chart element that we select such as **Pre-set, reflection, and bevel.** The **shape effects** are not available for all chart elements.

Changing the text format

To format the text in chart elements, we can use regular text formatting options, or we can apply a **WordArt format**.

1. Click the chart element that contains the text to format.
2. Right-click the text or select the text to format, and then do one of the following:
   - Click the formatting options that we want on the **Mini toolbar**.
   - On the **Home** tab, in the **Font** group, click the formatting buttons that we want to use.

To use **WordArt styles** to **format text** use chart elements in the following steps: (Figure 4.8(f)

Figure 4.8 (f)

1. In a chart, click the chart element that contains the text to be changed, or do the following to select the chart element from a list of chart elements:
2. Click anywhere in the chart.
3. This displays the **Chart Tools**, adding the **Design**, **Layout**, and **Format** tabs.

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4. On the **Format** tab, in the **Current Selection** group, click the arrow next to the **Chart Elements** box, and then select the chart element that to format.
5. On the **Format** tab, in the **WordArt Styles** group, do one of the following: (Figure 4.8(g))
   - To see all available WordArt styles, click the **More** button.

     We get options for Text related formatting
     - Text Fill
     - Text Outline
     - Shadow
     - 3-D Format
     - 3-D Rotation
     - Text Box

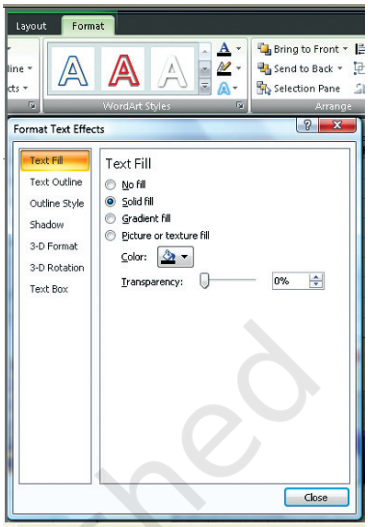

Figure 4.8 (g)

4.2.2.3 Changing the layout of the chart element

In the same chart, click the chart element to change, or do the following to select the chart element from a list of chart elements:

Figure 4.8 (h)

1. On the **Layout** tab, we can insert different Clip Arts, Picture, data labels, grids etc.
2. In the **Format <Chart Element>** dialog box, click a category, and then select the formatting options.

4.2.3 Change the Chart Type

A chart can be changed to another type of chart to get different look and purpose. For example, the chart shown in Figure 4.5 can be changed to Pie a chart (Figure 4.9) by using the chart tool as given on the Ribbon interface and in Figure 4.2. The every Pie of the chart represents the size of total sales in each quarter proportionately and whole Pie chart displays sum of all the Pies equals to 100%.

This is the easiest method to change from column chart or bar chart to Pie chart because

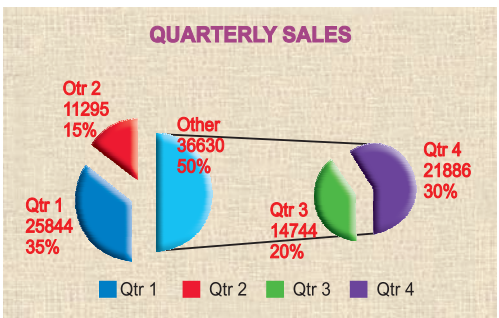

Figure 4.9

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- Only one data series is used to plot.
- The plotted data values are positive.
- The data values are not equal to zero also.

Figure 4.9 (a)

Figure 4.9 (b)

Figure 4.9 (c)

Figure 4.9 (d)

Figure 4.9 (e)

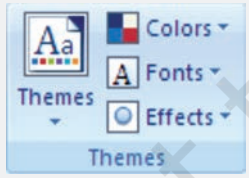

Figure 4.9 (f)

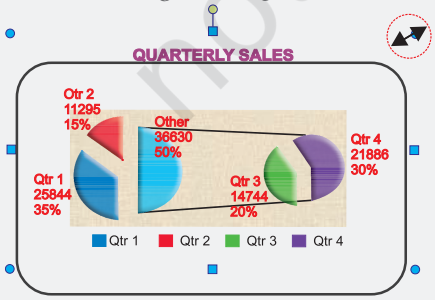

Figure 4.9 (g)

Note that in Excel software Pie chart cannot plot more than seven catgories. The categories represent the parts of whole Pie.

Steps for creating a Pie Chart

1. Enter the data in a worksheet.
2. Select the data from two (consecutive) columns only.
3. Select the chart type Pie from the ribbon.
4. Under Pie types select 3-D Pie option
5. Click the plot are of Pie chart this displays the **Chart Tools**, adding the **Design**, **Layout**, and **Format** tabs.
6. On the **Design** tab, in the **Chart Layouts** group, select the layout to use.
7. On the **Design** tab, in the **Chart Styles** group, click the chart style.
8. On the **Format** tab, in the **Shape Styles** group, click **Shape Effects**, and then click **Bevel**.
9. Click **3-D Options**, and then under **Bevel**, click the **Top** and **Bottom** bevel options.
10. In the **Width** and **Height** boxes for **Top** and **Bottom** bevel options, type the point size.
11. Under **Surface**, click **Material**, and then click the material option.
12. Click **Close**.
13. On the **Format** tab, in the **Shape Styles** group, click **Shape Effects**, and then click **Shadow**.
14. Under **Outer**, **Inner**, or **Perspective**, click the shadow option.
15. To rotate the chart for a better perspective, select the plot area, and then on the **Format** tab in the **Current Selection** group, click **Format Selection**.

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16. Under **Angle of first slice**, drag the slider to the degree of rotation that you want, or type a value between 0 (zero) and 360 to specify the angle of the first slice to appear, and then click **Close**.
17. Click the chart area of the chart.
18. On the **Format** tab, in the **Shape Styles** group, click **Shape Effects**, and then click **Bevel**.
19. Under **Bevel**, select the bevel option.
20. To use theme colors that are different from the default theme that is applied the workbook, do the following:
    a. On the **Page Layout** tab, in the **Themes** group, **click Themes.**
    b. Under **Built-in**, click the theme to use.

4.2.4 Resizing of Chart/Graph

Resizing of the chart means changing size of the chart as desired. This option can be used independently for the **fonts, title, legends** easily. The first step is to select the chart by clicking the left button of the mouse. Move the cursor on the corners or middle of the borders of the chart/graph which will provide the figure (the cursor will take the shape of a two headed arrow). By pressing the left button and drag/ pull as desired to resize the chart as shown by the red circle in the Figure 4.9a.

4.2.5 2D - 3D Charts/Graphs

To create graphs we use data which are plotted in two dimensional (2D) format (X- axis and Y-axis) as shown in the Figure 4.7. Where as

- Horizontal dimension is X-axis(contains categories)
- Vertical dimension is Y-axis(contains data)

When we plot the data on 2-D type of graph; the known value goes on the X-axis (independent) and derived (dependent variable) value on Y-axis. For example monthly demand of products (in Rs.); then on X-axis we will put Month and on Y-axis we will put the data values for demand.

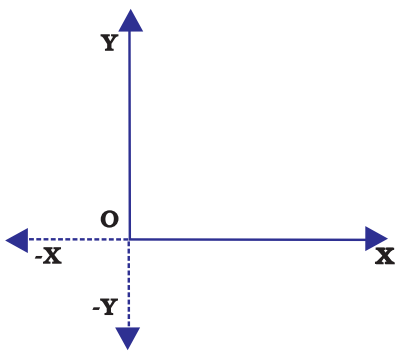

Figure 4.10

In the graph sometimes we have to present negative values also, which can be put on the opposite side of the axes from origin (Figure 4.10). The intersection of both the axes (X-axis and Y-axis) is called the origin (O) of the graph. We can put on the right side of the origin positive values and on left side of the origin negative values of data on X-axis. Similarly upper ward side of origin shows positive values and down ward side of the origin shows negative values of data Y-axis. For example, if we have data about monthly profit and loss to be plotted on graph;

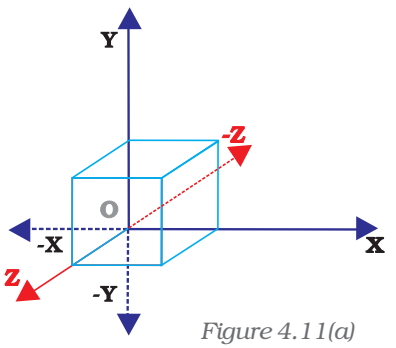

Figure 4.11(a)

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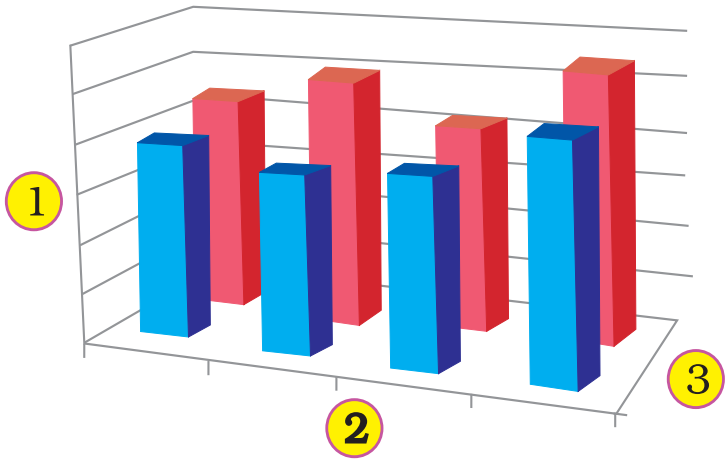

Figure 4.11(b)

here profit will be positive data values and loss will have negative data values.

2-D types of graphs/charts are line graphs, bar, area, surface column (horizontal or vertical), multiple line charts, radar chart, XY (scatter) or bubble chart.

The 2-D Charts typically have two axes (axis: A line bordering the chart plot area used as a frame of reference for measurement. The Y axis is usually the vertical axis and contains data. The X-axis is usually the horizontal axis and contains categories.) that are used to measure and categorise data: a vertical axis (also known as derived value axis or Y axis), and a horizontal axis (also known as category axis or X axis).

Sometimes graphs/charts can be prepared with three dimensional (3-D) effects. 3-D charts have a third axis, the depth axis (also known as series axis or Z axis), so that data can be plotted along the depth of a chart. In this type the third dimension is represented by Z-axis (Figure 4.11(a) & (b)).

For example to represent the volume we require three parameters height (Y-axis), length (X-axis) and breadth (Z-axis).

1. Vertical (derived value) axis – (Y-axis).
2. Horizontal (category) axis – (X-axis).
3. Depth (series) axis – (Z-axis).

Product	Lowest	Highest
Toothpaste	2345	12344
Toothbrush	500	5415
Hair Oil	988	3678
Shampoo	2900	3770
Toilet Soap	1122	3861
Bath Soap	952	2344
Total	**8807**	**31412**

Sometime we would like to draw the charts for comparison of values. Data that is arranged in columns or rows on a worksheet can be plotted in a radar chart. Radar charts do not have horizontal (category) axes, and similarly pie and doughnut charts do not have any axes. In Figure 4.12 radar chart is drawn for the comparison of highest and lowest values of sales of different products. Radar charts compare the aggregate values of a number of data series (data series: Related data points that are plotted in a chart. Each data series in a chart has a unique color or pattern and is represented in the chart legend. You can plot one or more data series in a chart. Pie charts have only one data series.).

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Similarly data can be arranged in columns or rows only on a worksheet and can be plotted in a doughnut chart. Like a pie chart, a doughnut chart shows the relationship of parts to a whole, but it can contain more than one.

Doughnut charts (Figure 4.13) are not easy to read. We may use a stacked column or stacked bar chart instead.

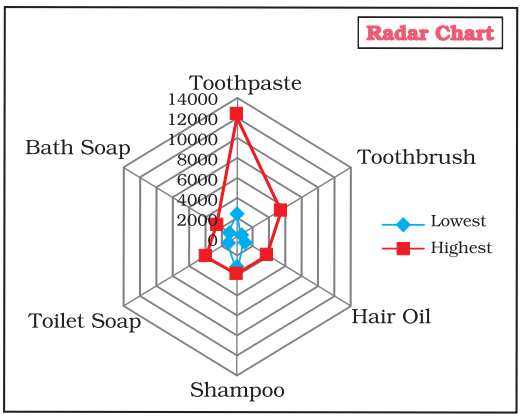

Figure 4.12

Doughnut charts have the following chart subtypes

Doughnut Doughnut charts display data in rings, where each ring represents a data series. For example, in the previous chart, the inner ring represents gas tax revenues, and the outer ring represents property tax revenues.

Doughnut Chart

Exploded Doughnut Much like exploded pie charts, exploded doughnut charts display the contribution of each value to a total while emphasising individual values, but they can contain more than one data series.

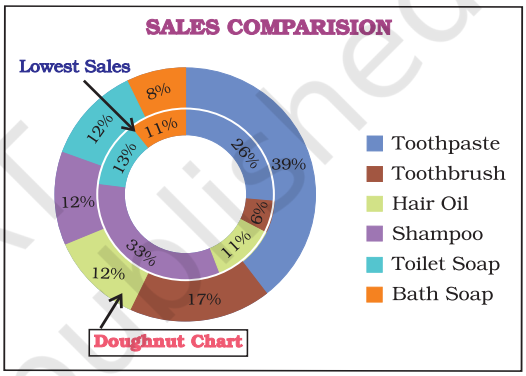

Figure 4.13

4.3 ADVANTAGES IN USING GRAPH/CHART

Help to Explore: Many times we would like to see if there is a relationship between variables. Suppose, that we wanted to determine if there is a relationship between: a country's GNP and the infant mortality rate, between age and between genders. It may be quicker and easier to create a chart immediately to see the possible relationship of variables to one another, rather than paging through raw data.

Help to Present: We want to provide information in as little time as possible. Graphing plays a key role. It seems that there is no longer any time to sit and read a newspaper in order to find out what is going on. However, newspapers, such as The Economics Times and India Today magazines (which were early users of charting techniques), seem to understand this phenomena and provide graphs to convey and sum up ideas that they are making in their articles.

Help to Convince: The same way that a graph can be used to present and explore different characteristics of data, it can also be used to convince. Graphs have the ability to take large amounts of information and make them into exhibitions that are easily used to persuade.

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Summary

- A **graph** is a pictorial representation of data. Graphs are usually 2-dimensional. Sometimes 3-dimensional graphs are also used.
- A graph may be either a **singleline graph or a multi-line graph**. Multi-line in a graph are distinguished either by using different shapes of line or different shapes and colors.
- Other popular pictorial representations include **Pie Chart** and **Bar Chart**. Pie charts depict relative share of different elements. Bar charts are used to depict the comparison of absolute values of data (e.g. sales, production, etc.) at discrete points (e.g. time intervals, products, etc.).
- MS-Excel 2007 (or simply Excel) provides a convenient facility to draw graphs and charts. The nomenclature used in Excel for charts (charts include graphs) is as follows:
  a. The Chart Area,
  b. The Plot Area covering the plot of values in the selected type of chart,
  c. The Data Points,
  d. The Horizontal (Base Values, e.g. category) and Vertical (Derived Values) Axes,
  e. The Legend to specify distinguishing criteria in case of multiple lines, pies, bars, etc.
  f. Chart and Axes Titles
  g. Data Labels
- Every elements of a chart – such as plot area, X-axis, Y-axis, **data**, **titles**, **labels**, **legends**, and **gridlines** – can be formatted using the Design, Layout and Format dialog box in Excel.
- Chart's size can also be changed as per requirements.
- For multiple visualisations of the same data through different typs of charts, we can change the chart type (say, from line graph to barchart, or bar chart to pie chart, etc) wherever required for better presentation as per the nature of data.
- Graphs and charts help in easy visualisation of any trends present in data. In highly random data such as stock prices, textual description may not be easily possible to explain the price or other fluctuations, but graphs and charts overcome this constraint as they can be comprehended more easily by human beings.

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Following are the steps prepare a chart :

Step – 1: Enter data in a worksheet with proper column and row titles.

Step – 2: Create a basic chart using the pattern from the panel available on top of worksheet in Chart groups' option.

Step – 3: Change the layout or style of chart.

Apply a predefined chart layout.

Apply a predefined chart style.

Change the layout of chart elements.

Change the format of chart elements.

Step – 4: Add or remove titles or data labels.

Add (Remove) a chart title.

Add (Remove) axis titles.

Link a title to a worksheet cell.

Add (Remove) data labels.

Step – 5: Show or hide a legend.

Step – 6: Display or hide chart axes or gridlines.

Display (hide) primary axes

Display (hide) secondary axes

Display (hide) gridlines

Step – 7: Move (resize) a chart

Step – 8: Save a chart

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EXERCISE

Q1. Multiple Choice Questions

1. To change the location of a chart, right-click the chart and select:
   a. Chart Type.
   b. Source Data.
   c. Chart Options.
   d. Move here.
2. The Ribbon allows us to:
   a. Create either an embedded chart or a chart sheet chart:
   b. Create only an embedded chart.
   c. Create only a chart sheet chart.
   d. Change the data values used to create the chart.
3. Once we have created a chart we may change _____:
   a. the formatting for text like titles and data labels.
   b. only by going back through the ribbon.
   c. everything about the chart.
   d. the data series patterns only.
4. In Excel the chart tools provides three different options _____, _____ and _____ for formatting:
   a. Layout, Format, Data Marker.
   b. Design, Layout, Format.
   c. Chart Layouts, Chart Style, Label.
   d. Format, Layout, Label.
5. Pie chart don't have more than _____ categories:
   a. Ten.
   b. Twenty Five.
   c. Seven.
   d. Three.
6. Column charts are useful for _____:
   a. Showing data changes over a period of time.
   b. Illustrating comparisons among items.
   c. Both a and b.
   d. None of the above.

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7. Doughnut charts:
   a. Contains more than one data series.
   b. Comparable with Pie chart.
   c. Both a and b.
   d. None of the above.
8. The 2D graph using _____ , _____ axes and in 3D graph _____ axis is also used.
   a. Category, value, vertical.
   b. Horizontal, vertical, depth.
   c. Category, value, series.
   d. b and c both.
9. Excel automatically redraws the chart _____:
   a. If any change is made in data.
   b. If any change is made in the range data.
   c. a and b both.
   d. None of the above.
10. Legend can be repositioned on the chart:
   a. anywhere.
   b. on right side only.
   c. on the bottom of X-axis.
   d. on the corner only.
11. Which chart element details the data values and categories below the chart?
   a. Data point.
   b. Data labels.
   c. Data marker.
   d. Data table.
12. From what command tab is the font size for an axis in a chart changed?
   a. Home.
   b. Insert.
   c. Format.
   d. Design.

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13. Which of these purposes does not pertain to charts?

    a. Identifying trends.

    b. Selecting values.

    c. Recognising patterns.

    d. Making comparisons.

14. What do you see if you move over the mouse over a chart object?

    a. KeyTip.

    b. ScreenTip.

    c. ChartTip.

    d. ChartKey.

15. Which group on the Chart Tools Format tab shows the name of the selected element?

    a. Arrange Objects.

    b. Chart Objects.

    c. Choose Selection.

    d. Current Selection.

Q2. Answer the following Questions

1. Define charts, graphs and how they are useful in business decisions?
2. Write down the usage and purpose of column chart, pie chart and line chart.
3. Describe about data series, legend, and data labels??
4. Describe use of Excel for preparation of chart.
5. Differentiate between pie charts, line charts and column charts respectively?
6. Described the steps to move, resizing and reposition a chart.
7. What does percentage in chart represent and how it being calculated by the software?
8. What are the differences between

a. Area, XY chart and doughnut

b. 2-D Charts and 3-D Charts

9. What is pie chart and what are percentage values means in pie chart?
10. Different types of charts which can be prepared using Excel?

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Q3. Skill Review

A. Create a trend chart after filling data in to the worksheet.

(Population of India/State in Millions to be enter)

Year	Male(1)		Female (2)		Total(3)	
	Literate	*Illiterate*	*Literate*	*Illiterate*	*Literate*	*Illiterate*
2001						
2002						
2003						
2004						
2005						
2006						
2007						
2008						

Note: *Total Literate = Values of Male Literate + Values of Female Literate*
Total Illiterate = Values of Male Illiterate + Values of Female Illiterate

B. Create a Pie chart to compare data from above table for Total (column number 3).

C. Draw a Trend charts for each male, female and totals separately.

D. Draw a Column Chart for the above data for each (male, female and total) separately for Literate and Illiterate.

E. Prepare a Pie chart and Column chart for the 10 different plots areas 5, 7, 8, 9, 8, 10, 4, 6, 7 and 3 hectares respectively.

F. Draw a Pie chart for the following data on vehicles registered in the **RTO** department during 2007-08 in your city.

Vehicle Type	Bus	Trucks	Auto Rixa	Cars	Two Wheelers	Heavy Vehicles
Number of Vehicles	575	5889	12345	9765	23456	65

G. Draw a Column chart for the following data.

Marks	0-20	21-40	41-60	61-80	81-100	Total
Number of Students	113	180	350	232	125	1000

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ANSWERS

1. d	**2.** d	**3.** a	**4.** b	**5.** c	**6.** c
7. c	**8.** c	**9.** c	**10.** a	**11.** b	**12.** a
13. b	**14.** c	**15.** d			

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